INTERNATIONAL JOURNAL FOR INNOVATION EDUCATION AND RESEARCH

ONLINE ISSN: 2411-2933 PRINT - ISSN: 2411-3123

INTERNATIONAL EDUCATIVE RESEARCH FOUNDATION AND PUBLISHER (IERFP)

Volume- 8 Number- 10

October Edition

About the Journal

Name: International Journal for Innovation Education and Research

Publisher: Shubash Biswas

International Journal for Innovation Education and Research
44/1 Kallyanpur Main road
Mirpur, Dhaka 1207
Bangladesh.
Tel: +8801827488077

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Edition: October 2020

Publication fee: $100 and overseas.

Editorial

Dear authors, reviewers, and readers

It has been a month since I was given the privilege to serve as the Chief Editor of the International Journal for Innovation Education and Research (IJIER). It is a great pleasure for me to shoulder this duty and to welcome you to ***THE VOL-8, ISSUE-10 of IJIER*** which is scheduled to be published on **1st October 2020.**

International Journal for Innovation Education and Research (IJIER) is an open access, peer-reviewed and refereed multidisciplinary journal which is published by the International Educative Research Foundation and Publisher (IERFP). IJIER aims to promote academic interchange and attempts to sustain a closer cooperation among academics, researchers, policy makers and practitioners from a wide range of disciplines, which contribute to state of the art in science, education, and humanities. It provides a forum for the exchange of information in the fields mentioned above by welcoming original research papers, survey papers, and work-in-progress reports on promising developments, case studies, and best practice papers. The journal will continue to publish high-quality papers and will also ensure that the published papers achieve broad international credibility.

The Chief Editor, appointed by the Associate Editors and the Editorial Board, is in charge for every task for publication and other editorial issues related to the Journal. All submitted manuscripts are first screensed by the editorial board. Those papers judged by the editors to be of insufficient general interest or otherwise inappropriate are rejected promptly without external review. Those papers that seem most likely to meet our editorial criteria are sent to experts for formal review, typically to one reviewer, but sometimes more if special advice is needed. The chief editor and the editors then make a decision based on the reviewers' advice.

We wish to encourage more contributions from the scientific community to ensure a continued success of the journal. We also welcome comments and suggestions that could improve the quality of the journal.

I would like to express my gratitude to all members of the editorial board for their courageous attempt, to authors and readers who have supported the journal and to those who are going to be with us on our journey to the journal to the higher level.

Thanks,

Dr Eleni Griva
Ass. Professor of Applied Linguistics
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The Systems Theory Conceptualised And Pasted to Teaching and Learning

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Abstract

Though the Systems Theory had been successfully and variedly applied in different world settings, however, it is hardly conceptualised and related to the core bussiness of the schooling system: quality teaching and learning. In this article, I used it to adress such litrature gap and contribute some knowledge on its interactive components' functionalism in order to accelerate upwardly the learner results. Such knowledge was a culmination of the voices of those in the field of teaching. To make sense of how the systems as sub-systems and supra-systems are interconected in schools as organisational structures, I utilised the qualitative inquiry. Data generated and analysed, revealed that the Systems Theory survives in the schooling system through its key features namely interdependance, relationships and interactions among its components as well as feedback, adaptibility and flexibility to the environmental contexts where adaptation makes the school human structures to cope with the unexpected atrocities. The lesson learned is that each part affects the functioning of the whole. For example, if one grade educator is on leave, it takes time for learners to adapt to the teaching philosophy of the other one. Further, though the Systems Theory in this article appeared to be applied successfully with its voluminous enabling interconnected factors, however, it was discovered that it's not free from some systems' roadblocks. Through the principle of adaptibility, some systems' constraints had a strength to turn some teaching and learning threats into opportunities. At its finality, data also showed that to make Systems Theory a reality, its sub-systems in the school and supra-systems in the environment where the school is situated, are to function as collective twins for making the school a centre of excellence. So, in the South African school contexts, the Systems Theory links the schools' functioning to its interconnected parts.

Keyword: *systems theory; Remove systems theory; supra-systems; Remove supra-systems; systems dynamics; Remove systems dynamics; cybernetic systems Remove cybernetic systems viable systems*

Introduction

Although systems theory is successfully and variedly applied in most settings, namely industrial settings and social world, hardly any literature conceptualises and relates it to the quality teaching and learning. Focusing on such literature gap, the rationale on presenting what constitutes the systems theory nests on providing the light to those who enter the research room intending to test the credibility of their empirical work relating to school systems in particular. Further, though the systems theory emerged from biology (Boulding, 1956 & Von Bertalanffy, 1951); mechanical engineering (Ashby, 1954 & Wiener, 1948);

organisational communication (Parson, 1951 & Poole, 2014), in this paper, I use it to contribute some knowledge on its components' interactive processes to escalate learner results. Such knowledge may be useful to school managers under construction or those who aspire to be, as well as those in similar contexts of making sense of the curriculum. Thus, the primary objective is to nest the systems theory on the school where it is envisaged that the interaction or interdependence exists among the internal sub-systems themselves as well as the environmental systems.

Drawn from the above, the systems theory's historical background forms the point of departure. Next, to bring home its concept and enable the reader to make sense of it, I provide its conceptualisations of key terms namely systems theory and its other components as reflected in section that discusses the key concepts. Further, in making sense of the voices of those in the schooling system, emerged lessons displaying its significant to the school setting are discussed. At its final end, the key message it paints to the reader is presented.

Historical background

According to Lai and Lin (2017), the systems theory is as old as 1950s. These authors claim that in viewpoint of Von Bertalanffy (1951) and Boulding (1956), the systems theory was biologically constructed intending to bear a series of systematical theoretical tools to discuss the empirical world. In this manner, Boulding (1956) adds that it was necessary to have a science-bound skeleton aiming to provide a systematical structure to unpack the parts ensembled to make up a subject matter in particular. Hence the systems theory was born. Another second view revolves around systems theory being the brainchild of interrelated parts of mechanical engineering. In this regard, Ashby (1954) and Wiener (1948) assert that such mechanical engineering systems as they function to control the engine, they are cybernetic in make-up. More meaning on cybernetic existence is provided on a subheading that conceptualises cybernetic systems. Third, the systems theory originates from what systems perform as components that communicate in an organisation (Parsons, 1951). Parsons (1951) being responsive to the systems theory opines that the environmental demands play a major role regarding the functionality of the systems.

Regarding the environmental demands, Lawrence and Lorsch (1967) view systems shift from mechanical stance to human behaviours encapsulating organisational relationships. This connects systems to schools as learning organisations with a variety of human beings who must respond to ever-changing environmental and social demands. Whereas Lawrence and Lorsch (1967) view understanding the impact of responding to ever-changing environmental and social conditions, on the other side, Poole (2014) specifies communication in an organisation as one pivotal part of the systems. This systems idea may be true when considering that some school's inputs namely vision, mission statement, circulars, school allocation, policy documents etc. require to be communicated by school human beings to others. Having discussed the origins of the systems theory, it is crystal clear that its sources are multi-pronged as some are technical, organisational and disciplines-bound. Due to its ability to influence the school's processes, systems theory makes no learning organisation to function efficiently and effectively without it being the school's nucleus.

Key concepts

In this paper, systems theory is a salient concept, therefore, its relationship to teaching and learning is discussed throughout. The literature provided in the two sections above, signposted systems theory's influence as the functioning of the ever-changing organisation as well as its environmental relationships. Given Mele, Pels and Poleses' (2010) systemic approach outlining that systems do not exist in a vacuum but in an organisation in relation to its environment, the relationship between sub-systems and supra-systems emerged. In this regard, as parts or structures of a system also adopt communication and control while interacting, Ashby (1954) and Wiener (1948) maintain that they are cybernetic in nature. Further, when the sub-systems succeed in adapting to the context that is beyond the organisation context, they exert flexibility and viability (Mele, Pels & Polese, 2010). In this manner, it is worth conceptualising systems theory and its elements too namely supra-systems, systems dynamics, cybernetic systems and viable systems.

The systems theory

According to Lai and Lin (2017), the systems theory refers to the systems approach that is two-pronged. As such, it focuses largely on the organisation's (school's) relationships and interactions among its components. Since the learning organisation exists within a particular environment, this entails relaying a balance emerging from the interactions among internal and external components of the system. Department of Education (2008) asserts that systems theory is what in a school exists through its five components namely inputs, transformation, outputs, feedback and environment. In this regard, the inputs are underpinned by its components in the likes of finances; human factor; LTSM[1], other LTSM[2] and non-LTSM[3] as well as other significant components in the society that are a must-be to provide basic education to all learners. Since systems are based on interdependence among their components, if one of the components does not perform, the whole system fails (Mele, Pels & Polese, 2010). In concurrence with the preceded argument, I argue that if during transformation process regarding planning, leading, organising and controlling, the same controlling part does not take place, the whole planning cannot bear quality outputs (results).

Conceptualising the systems theory may be confined to how the organisational branches or inputs perform. Like in a soccer game, a football club exists because of the healthy relationships as well as interactions among its players, captain, club caretakers, technical staff, head coach, managers, donors, support staff and other materialistic assets. The same attains with the school that exists due to its functioning through the available interrelationship among everybody, every physical matter within its strings and the energy derived from the external forces. However, remaining convincingly that there is an active interaction among the school components remains a theory until the voices of the school-based human inputs are researched and analysed as reflected in the sections that describe the enabling factors and constraints among the school systems in the schools studied.

[1] Learning and Teaching Support Material referring to principal educational material e.g. textbooks and learner stationery.
[2] Other educational materials not directly touched by learners but support their learning e.g. chalks, photocopiers etc.
[3] Office equipments, consumable items, domestic services, school buildings and equipments.

Flowing from the above, the systems theory remains the system if its smaller components continue to maintain the process of interdependence in order to keep the whole school system accomplishing its set targets. Clearly, the systems theory in the school world-view sees it in terms of identifiable interdependence among its constituent parts that make it a whole. Further, it suggests that a system (school) is what it is because of its more than two parts interact with other parts in the same system to influence the behaviour of the whole system. At its final end, the systems theory apparently must be an entity with its properties to function interdependently and be adaptive to social disruptions in order to attract as well as retain more societal learners year after year.

Supra-systems

According to Golinelli (2000); Golinelli (2005) and Barile (2008), supra-systems refer to the interrelations that exist between the smaller properties and the larger significant others that have an impact on the functioning of the whole school system. For example, the direction which the whole system (school) takes, depends largely on the interaction among its internal sub-units and super-units which are sub-systems and supra-systems. To illuminate, developing the school financial system, requires the interaction of the educator, non-educator components with the supra-components (parent governors). This entails that if one of the school financial components in the finance committee that reports to the School Governing Body is malfunctioning, the whole financial system is crippled. In this manner, the intra- and interaction of sub-systems and supra-systems are the system's essential properties that define it. Thus, supra-systems entail the relativeness between internal living organisms and the other input energy from the outside school world that influences the process of working together.

Systems dynamics

Keyton (2017) refers to systems dynamics as a theoretical approach that focuses on matter with the ability to display constant changing, re-organising and adapting over time. Here, people involved in the system do a deep study of the factors that necessitated changes and do turnaround strategies to move forward. For example, if in the previous year, regarding learner performance, the school as the mother body system attained 95% pass rate but on the current year attains 72%, this reflects a result plummet change over time. However, the multistakeholders (the school interest sub-components) under the leadership of the school principal re-organise themselves, do the 'Strengths Weaknesses Opportunities and Threats (SWOT) analysis and come up with School Academic Performance Improvement Plan (SAPIP) to revert to beyond 95% in the ensuing year. Another example, as there is emergence of fourth industrial revolution[4] (4IR) era, all staff personnel members need to redefine their technological roles and responsibilities in order meet the ICT[5] demands over time. Further, to manage school working conditions according to Covid-19[6] demands, its emergent (Covid-19 pandemic) brought in new school health and safety measures for school systems to be innovate, dynamic and adaptive (KwaZulu-Natal Department of Education, 2020). Thus, drawing from the above, systems dynamics relate to accepting that change is inevitable in a school set-up and be clear

[4] refers to connected technology built on 3rd technological world with people fast digitally able to manage their lives using varied technologies.
[5] refers to information communication technologies in the likes of internet, wireless networks, cell phones, and other communication means.
[6] an infectious Coronavirus disease emerged in 2019, commonly reached South Africa in 2020 and declared a global pandemic in 2020.

that it occurs as a direct results of school multi-levelled systems interactions. In this regard, all school participants constituting the whole school system need to work together continuously to achieve more and be adaptive to unforeseeable changes.

Cybernetic systems

Though historically, the cybernetic systems are mechanically intertwined to control the functionality of the engine, however, in this paper, they explicate the control and communication functionalism particularly in the school as the organisation (Mele, Pels & Polese, 2010 in Almaney, 1974). Regarding the control and communication, Mele, Pels and Polese (2010), argue that cybernetic systems depend on a myriad of feedback or control systems that have the ability to process information and lead to changes for better results. Novikov (2016) flocks together with Mele, Pels and Polese (2010) on mentioning that when systems are in control of planned activities, they lead to control theory whereas if information is processed, it becomes a communication theory. The implication is that the results out of the formal assessment tasks as parts of planned activities are processed or analysed, such result analysis may lead to improved changes in both teaching-learning processes and assessment task design (inputs). In a nutshell, the assessment outputs communicated turn communication theory into practice-control theory. Thus, I perceive cybernetic systems as the operational approach consisting of its frontline parts namely inputs (educators, learners, teaching and learning resources, time-use etc.) engaging on communicative processes (teaching, assessing, diagnosing and doing feedback for remediation purposes) for further accelerating outputs (results). Clearly, cybernetic systems tend to represent the available means of communicating what is best for achieving basic education in line with the set school goals and give birth to corrective stipulations on the basis of outputs and feedback.

Viable systems

Whereas Espejo (2003) suggests that the viable systems are powerful to respond to all emerging new social thought provoking and changing environments, however, they are linguistically, the systems illuminating the abstract noun ‘viability’ referring to fluidity, flexibility and adaptability to the unexpected distractions. In this manner, Mele, Pels and Polese (2010) and Espejo (2003) draw the same pattern on arguing that the viable systems are there with a capacity to produce responses to all the environmental disturbances. Fitting the aforesaid description to the work of Beer (1972) on systems theory cited by Hildbrand and Bodhanya (2015), the viable systems seem to allow for adaptability for the sake of surviving in the changing contexts. Concomitantly with its flexibility and adaptability features to the unexpected events, Espejo and Gill (2011) equate it with the flexible balancing entity between the internal and external systems to avoid recurring disorders in the environments. This suggests that the environments may be clouded with disruptive features that can affect negatively the learning outputs. Therefore, the school systems in place must be flexible enough to turnaround such may-be mushroomed events in their environment.

In inheriting the fundamental principles of viable systems (viability, fluidity, flexibility and adaptability), Espejo and Gill (2011) metaphorically cite the example of driver losing control of a car. To illustrate, as

the car wants to capsize, the driver responds to the unexpected occurrences by driving slowly, applying brakes and stop the car to diagnose the problem. This allows the driver to pay more attention to the car disturbances. Such scenario is pasted to the schools that planned in 2019 and in 2020 they are confronted with Covid-19 pandemic disturbances. For the schools to be adaptative and contingent, they need to be more spick and span than before, review their budget plans to buy some unbudgeted personal protective equipments (PPEs) not supplied by the Department of Education; they learn new adaptative teaching and learning methodology and adopt new protective measures like teaching and learning with masks on, monitor social distancing, deep disinfecting as well as hand sanitising etc; review their management plans to cover for the vacuums created by comorbidities and the likes. In this instance, sitting on laurels and waiting for the Department of Education may produce more harm than good.

Drawn from the above social and institutional scenarios, communicating available measures to control the unexpected dangers are nobody's choices. The two principles of communication and control that existed, put more meaning to the viable systems approach to be grounded in the cybernetic systems. Having highlighted the principles responding to the environmental events, it allows the viable systems to be adaptive and flexible system of responding to new conditions. Clearly, viability, fluidity, flexibility and adaptability, all describe the ability of a system to exist and survive despite the mishaps it faces. Therefore, the viable systems answer the question why institutions like schools in particular, whether non or Section 21 status, rural, semi-rural or urban exist and how systems foster their relations to ameliorate their social relationships for the success of major stakeholders[7].

Another concluding idea deriving from framing the key concepts lies in the similarities and differences between the systems dynamics and the viable systems. Though the systems dynamic and the viable systems are identical through their umbilical cord of being adaptive to changes, however, the former is more of responding to familiar processes namely orders in the organisation whereas the latter (the viable systems) overtakes the former (systems dynamic) by being responsive to sudden disruptive adversities that occur as direct changes in the organisational environments. I, therefore, assert that the capacity to adapt to changes regarding usual events in the school and responding as quick as lightening to the new unexpected atrocities, points to the hallmarks of both systems dynamics as well as viable systems. For example, when the school engages on budgeting for the ensuing year, it relates to systems dynamism, however, when it deviates from the same budgeting to respond to the demands of Covid-19 global amenities, it has a potential of being a viable system.

Methodology

Since in viewpoint of Litchman (2006, p.8), a qualitative research concerns with providing an in-depth description and understanding of the lived experiences of human interaction, this paper took a qualitative inquiry route. However, the main focus of the paper was on understanding how humans interact as one component of the system with other systems which eventually result to quality teaching and learning. Further, whereas Hildbrand and Bodhanya (2015) contend that it is only through the richness of the

[7] Out of education interest groups, learners constitute major stakeholders

qualitative data analysis and its reflective process that the researcher is able to detect shortcomings among several subsystems, similar qualitative research picked up the merits and demerits among sub-systems and supra-systems.

Befitting the purposive sampling, was Khuzwayo's (2015, pp.122-123) five principles of choosing information-rich sources namely knowledgeability about the phenomenon, manageability based on specific number of participants, willingness to participate, role function in the population and their relevance to research questions. To expand, the school-based participants were deliberately approached due to the aspects that they were most knowledgeable, had the best insight about interrelatedness among sub-systems and supra-systems and could answer the following two key questions:

1. *To what extent does the interaction among the school systems make better functionality in the South African Contexts?*
2. *What is the nature of interactive relationships among the school sub-systems and the supra-systems?*

For confidentiality and anonymity of participants' information, their schools' names were School A Participant, School B Participant, School C Participant and School D Participant. Regarding the data generation method, I utilised semi-structured interviews to examine how the inputs' school sub-units influence the outputs and provide the best insight about the systems interactive processes. While analysing the data, the emerging themes were the enabling factors among the school systems and the constraints inherited from the interactive processes among the school sub-systems and the supra-systems in the external environment. In this regard, in making sense of the participants' verbatim responses, I began with discussing the enabling factors among the school systems in the schools studied.

The enabling factors among the school systems in the schools studied

To draw closer to the key question that focuses on the extent of the interaction among the school systems that makes better the functionality in the South African schools' contexts, the following sub-themes emerged: human interaction as a feature of a system, effective time-use as a feature of a system, monitoring as a critical feature of a system, finance processing as a feature of a system and filing system as a feature of a system.

Human interaction as a feature of a system

Having analysed the data, I discovered that humans as parts of the school system function well when interacting with others in various structures. For example, according to School B Participant, those in the SGB[8] interacting with others in various structures namely Finance committee, Building Maintenance committee, LTSM committee, Fundraising committee, Sports committee, carry and balance the functioning of the school. Apparently, at the helm of the functioning of the school, interaction among humans inside and the energy exerted by those coming from outside as parents' representatives work well. So, the

[8] refers to School Governing Body members as policy makers who in terms of South African Schools Act No. 84 of 1996 as amended, are representatives of parents, educators, non-teaching staff and learners (from Grade 8 or higher).

interaction among non-professionals and professionals is fundamental to quality teaching and learning. The process of human interaction makes it part of the imperative features of the school system.

Specifically, according to School A, B and D Participants, communication, consultation and timeous feedback among the human structures glue the human interaction into schooling system. In this instance, in viewpoint of School B Participant, in a schooling system, the communication among human structures like LTSM committee with subject educators makes it possible for harnessing relevant teaching and learning tools. In this regard, the School B Participant voices that consultation between educators and LTSM Committee breeds procuring the relevant and usable learning and teaching needs. Otherwise, if this consultation is ignored, the purpose of learning using such material can be a fruitless expenditure and hits bad to money value. This illustrates that communication and consultation among the school human capital defeats the dearth of relevant teaching and learning support material. So, communication and consultation among the school systems become purposive in nature.

In advancing communication and consultation among the human structures, School A Participant views a strong relationship that exists among the principal, educators and SGB in communicating school vision and mission. It seems that the strong relationship among the human structures is the common denominator that signifies the tasks performed by systems' components for attaining vision and mission. As the output out of such system communication puts the school forward as achieving the school purpose, Lai and Lin (2017) regards the operation of such parts of the system as happening for goal attainment.

School D Participant revealed that in their school there is a good communicative relationship among educators, parents and learners. In support to this, she further said, 'sound communication relations are encouraged by a timeous feedback system on learners' learning and achievement progress'. Lai and Lin (2017) confirms that constructive interaction on the pedagogic outputs links the school with other stakeholders in the environment where the school exists. On the strength of the above, I, therefore, argue that central to achieving quality teaching and learning, a sound communicative relations and timeous feedback (reporting process) are some chief systems processes required.

Effective time-use as a feature of a system

School B Participant claims that all stakeholders succeed through sharing the allocated times. School C Participant claims that in their school, principal always motivate the whole nineteen staff personnel to continue being punctual at school, in the classroom and teach for setting the scene for excellence. School D Participant asserts that Departmental Heads submit on time to the principal, typed weekly written work reports as well as quarterly accountability learner performance data tool reports. In making sense on time-use processes, Department of Education (2011) asserts that it is all about using time as a transformation system factor in the school context to render teaching and learning service.

Based on the above claims, effective interactions among the systems components could lead to goal attainment on specified time allocated. In this way, I opine that if sharing the allocated times and performing tasks on time exist for the purpose of achieving the set target goals, this is a purposive

intervention among the school's systems. Effective time-use links School B Participant to Lai and Lin (2017) with symbolising such time with goal attainment emanating from using it as a resource to accomplish goals. This illuminates that the more the school's stakeholders can share allocated times using time-tables as well as period time-tables, the greater the chances that effective teaching and learning occurs. Thus, effective time-use relates to processing information, at a given time, that emerges from conscience collective work between individuals. Notably, effective time-use twins with effective supervisory control to sustain improvement continuity in teaching and learning processes. For example, lack of supervisory control could lead to educators prolonging their staffroom stay or even arriving at school as they wish at the expense of classroom engagements with learners.

Monitoring as a critical feature of a system

To actualise monitoring process as a system, School B Participant regards it as part of human interactive progress checking process among the principals, deputy principals, departmental heads, the full-time educators and parents in particular. In this regard, he stresses that the immediate supervisors must regularly monitor the relevance of the subject content, conducting the phase meetings to discuss the implementation of ATPs[9] and CAPS[10], drafting assessment plans and assessment time-tables, pre-moderating and post-moderating formal tasks, capturing data to the SA-SAMS[11], analysing learner results and doing subject improvement plans. Lai and Lin (2017) opines that while in Parsons (1951) this process is structural functionalism[12]. It is specifically so, because of the human supervisory role to exchange thoughts with others in maintaining, developing and making the system works in a chain-ring shaped[13]. Therefore, to escalate systems outputs (learners' results), structural teaming system in a form of chain is a mother of success. Monitoring as the participants outlined, relates to supervisory control on checking progress relative to set targets and planned activities (Shapiro, 2007). This points out to monitoring as a systemic tool used by school managers particularly in schools to periodically check whether people under their care are working closer to achieve the operational plans.

Finance processing and filing system as features of a system

According to School B Participant, school financial structures chiefly school finance committee, finance officer, staff and other SGB components are critical features of the school system. They are there to receive school allocation funds, draft budgets and present to parents and keep proper recordings in filing system for auditing purposes. Regarding keeping proper recordings as part of filing system, School C Participant asserts that through safekeeping and SGB collective implementation of regular income and expenditure of funds, at their school, they are able to procure LTSM, budgeted educational equipments and pay for school domestic accounts on time. This is in line with SASA (1996) as amended, Sections 16A (1), (a), (v); 35; 38; 42 and 43 that determine the schools operational financial filing system. This points out that if one of the outlined finance sections has frozen, the school progressive system dwindles. Emerging factor is that

[9] Annual Teaching Plans as curriculum schedules suggesting the exact topics to be taught on specific day-times throughout the school year.

[10] Curriculum Assessment Policy Statement referring to current policy curriculum guidelines on imparting content knowledge and competencies in South African schools.

[11] South African School Administration and Management about all school subsystems.

[12] Functioning structure in an organisation

[13] A chain comprises of its interconnected strong rings, suggesting a collective systems process.

the importance of safekeeping finance records and collective use, influence other parts to function well for keeping available some fundamental educational goods.

The constraints among the school systems in the schools studied

Having analysed the voices of the participants, emerged sub-themes showed that the interactive relationships within the school's systems, also have some shortcomings. They are, but not limited to, the shortage of staff to do work, post establishment and low learner enrolment, the emergence of unexpected events and the lack of training as a constraining systems factor.

The shortage of staff to do work as a constraining systems factor

While School A Participant emphasises the role function depicted by human strong relationships among the components of the system, however, in her school there are two unfilled vacancies namely the administration clerk and general assistant: cleaner. It puzzles how the other parts accomplish the teaching goals without the support of the other two. The unavailability of other parts in the midst of systems' functioning often produce peculiar results and de-accelerated performance (Espejo, 2003). This suggests that in school A, the dearth of the other two parts may fail the school functioning system and put it off balance to achieve optimally. Since the filling of vacancies explicates the functioning of the office system higher than the school one, it entails that the sub-systems need the live wire of the supra-systems to maintain equilibrium and to serve the major goal of the education system.

The above shows that, for schools to enhance teaching and learning, they sometimes depend on the Department of Education for employing human resources ahead of teaching process. This requires effective communicative relationships between the systems of the department. Otherwise, the school without sufficient staff members becomes a teaching and learning roadblock. Data findings also pointed out that though some schools having tasted the absence of the support staff, however, they are more adaptive to change. In this regard, the School A Participant reflected that they hired the local persons for cleaning and keeping the administrative work rolling up. This best fit the basic feature of viability and flexibility that calls for standing up against the odds. Being adaptive to sensitive environments seems to be the key factor to withstand the unbearable events.

Post establishment and low learner enrolment posing positive threats

The research interviews in both schools A and D, further revealed that though the post establishment as part of the working system poses some teaching and learning threats but it can be a positive re-enforcer. Participants claimed that since they are understaffed as a direct result of low learner enrolment, they are the victims of multi-grading system[14]. They said that although they are principals but they are full- time educators and this retards progress on their supervisory and management duties. On the other side, it seems they have begun to adore being the full-time educators. To them, though understaffed, interacting with all grades learners simultaneously do assist in knowing their (learners') learning shortcomings and have the implementation of ATPs at their (educators') fingertips. Inherited from their responses, the staff

[14] Teaching and learning system relating to placing learners from different grades in the same class and taught using one time-table.

establishment and low learner enrolment as teaching threats are turned into teaching and learning opportunities. The emerging view is that while the unexpected atrocities may mushroom, however, they are wakeup calls to strategise and sometimes ameliorate the system to lessen the tension.

The emergence of unexpected events as a constraint systems factor

The participants felt that whilst finance system forms the baseline of achieving the end results, however, the emergence of the unexpected events at times forces some deviations from the planned activities. In support to this, School A participant voiced out that the planned school budget can become interim budget if the department fails to deposit school allocation monetary system in good time. School D participant confirmed that school burglaries like stealing smart tablets and laptops weaken the management of teaching and learning process that aims to brighten the future of all learners. According school C Participant, it is worse if the thieves are from the local community and the Department of Education does not replace on time the stolen educational materials. Further, to school B Participant, this suggests that when the unplanned events crops out, they have a potential to distabilise the teaching and learning inputs from functioning smoothly to attain the intended outputs (excelling learners). This depicts that while the unexpected events emerge, the gap between sub-systems and supra-systems glows to widen teaching and learning constraint systems factor.

The lack of training as a constraining systems factor

School B Participant laid a concern that knowledge dissemination from higher education structure is found wanting at the current Covid-19 scaring season. In this way, she said that Covid-19 revised ATPs were just left to schools without training educators on how to integrate such ATPs with the surge of Covid-19 straining processes. In the same vein, School C Participant complained that at their school, IDT[15] officials drilled only Covid-19 handwash station stands and left no handwash containers that they eventually supplied back after a month. It was added that such handwash stations were still not in use because they were installed after working hours and no training provided on their usage. In addition, the cleaners were not trained for using hand, surface and deep disinfectants. This illustrates that the training system lacked special heed regarding the empowerment of educators, support staff and PPEs[16] handlers on handling the Covid-19 new demands. This points to policy intentions disjuncture that may lead to poor curriculum implementation and overburdening health care system to respond as planned to the SOPs[17] expectations. Notably, it left misdirection and confusion on the other parts of the system in implementing re-adjusted school-based teaching strategies and Covid-19 new health protocols.

Similarly, School D Participant as the novice principal seemed to be unhappy on being handed over with the bulky school thousands of rands without pre-financial management workshop. He added that some financial management workshops if organised, took a day, yet, they contain voluminous finance regulation systems. The consequence therefrom, led to poor handling of school funds. This signals two unhealthy finance system relationships namely human structure-school finance phobia as well as a broad line between

[15] Independent Development Trust is a government agency for delivering social infrastructure. For this paper, it acts as SA government official resource provider during Covid-19.
[16] Protective Personal Equipments refer to equipments worn to minimise exposure against Covid-19 hazards in particular that may cause injuries or diseases.
[17] Standard Operating Procedures refer to a set of guidelines regulating in detail how to safely manage hazardous cases at workplace

the supra-system (financial service providers) and sub-system at schools. Flown from the lack of training alluded above, is the light that the systems function ineffectively if the right hand does not provide necessary support to its left hand or vice versa. Notwithstanding the shortcomings available above, the school systems have to work hands and gloves.

The emerging lessons out of the systems described

Drawing from the voices of the participants and literature studied, systems theory is the brainchild of the dynamic relationships and interdependence among the components of the system that forms the organisation. For the purpose of this paper, the organisation refers to a school. In the light of the preceding statement, Lai and Lin (2017) opine that a system stems from the nature and patterns of the relationships resulting from interactions among the components of the organisation. The lived experiences of the participants illuminated that keeping interactions alive, balanced and effective among components, requires monitoring, communication and consultation in order to adapt to the changing circumstances. Centrally to monitoring and maintaining a system's existence and effectiveness, sits the human structural behaviours as the systems' captains.

In placing emphasis on such pivotal human role function, Lai and Lin (2017) while citing Parsons (1951) assert that the systems theory in a school as an organisation where an interactive communication occurs, depends on the functioning of structures available. Data also showed that built-in the open systems theory, a school and its stakeholders are collective twins, that are linked through varied communication interrelationships. In this manner, communication interrelationships are espoused in a series of contacts created by the flow of messages among the staff personnel and others at specified times (Monge & Contractor, 2003). For example, it is evident in this research that a sound communicative interaction among the teaching staff and learners as well as a continuous feedback system in place, would enhance quality teaching and learning. The emerging knowledge revolves around understanding that the systems theory survives through how the schools as organisations function and how the human structures respond to the environmental adversities.

This empirical research outlines the key properties of the systems theory in the likes of interdependence, relationships and interactions among its components, feedback, adaptation and flexibility to its environment as well as communication, control, monitoring and maintaining the system's functionality. In a nutshell, the emerged key properties of the systems theory have a potential to provide meaning to quality teaching and learning. In addition, they make sense to all the education interest groups to understand the purpose of the school as an open system and functioning of its parts to form the chief whole. This entails that each part of the whole system needs the other one to function well and to cope with its environmental acrimonies.

To expand, out of the significance of systems theory as detailed above and below, a further research is required to understand how systems make all the schools functioning as arenas for achieving quality teaching and learning. Another emerged lesson found, is when the interdependent system parts are well oiled, a continuous learner performance becomes cyclical and likely to take upward trajectory. This implies that, at the peak of health interaction of school parts, there is an envisaged quality teaching and learning.

Regarding maintaining exorbitant continuous learner performance, data analysis revealed that functioning or interaction of the system depends on the context on which it has taken place or how other parts function for a particular purpose. This entails that various systems as they interrelate to one another, they also overlap for goal attainment (sustainable excellent learner results). Thus, the excellent high standards in a school as an open system is rooted in the way the systems function. As the car's turning systems keep it in motion, significantly so, with the school's interacting systems that shoot up its end-products.

Though the data revealed so much on enabling factors in the schooling systems studied, however, such schooling systems were found not free of shortcomings as discussed earlier on. Likewise, with the Department of South African Policing Services, as dearth of adequate policing infrastructure could lead to criminality pandemics, in the same vein with the Department of Education, understaffing and meagre infrastructure provision lead to malfunctioning of teaching and learning system. The shortcomings discussed, illuminate that the meagre ambition to interact among the systems hampers the accomplishment of the set goals and in a school context, high learner performance ceases to be practicable visible. This shows that if the system lacks a collective functioning, interrelationships between sub-systems and supra-systems are hardly smooth sailing. Despite the interaction among the components of the system, however, there are different relations.

Conclusion

The key message based on the systems theory portrayed in this paper illustrates that its conceptualisation is twofold. First, the frontline school managers must have an understanding that no school functions well without the set of its two or more parts interacting with one another. Such recurring interaction need to exist among humans (non-professionals and professionals), physical, financial and intellectual school capital. This entails that the work-alone person placed at the helm of managing teaching and learning cannot endure high learner performance. The required factor is to permit the interactive process among the school components (school capital) to meander among them. Thus, a chain of multi-components plus their sound relations in a school in particular works well. Laszlo and Krippner (1998) views such set of multi-components as a group of interrelated components that performs some identifiable functions with other systems. This further suggests that when the school components interact, they perform some visible functions on the eyes of the onlookers.

Second, inherited from the definitions of key concepts up to analysing the voices of the participants, the key common denominator has been the collective functioning of the school components. So, the second knowledge contributed is based on Laszlo and Krippners' (1998) thought as cited in Ackoff (1981, pp. 15-16) that school systems has two qualities. Such systems qualities are: each part has an effect on the functioning of the whole and it is affected by at least one other part in the system. For example, if the photocopying machine becomes out of order, it affects the whole process of teaching and learning. In this manner, the external people as well as the internal individuals requiring printed and photocopied materials are affected. Again, if one educator is absent, it takes time for learners in the school system to adapt to the other relief educator. Further, in performing learners' results systems analysis, the School Management

Teams[18] (SMT) may start from inward analysis of the school sub-systems and outward to the external environment to put into barometer the participation of the supra-systems. In summing up, with the schooling systems, one must understand the purpose of the school functioning as a system within its boundary and outside with its tangible significant others.

Clearly, each line or sentence discussed in this paper, enabled systems theory to cross over into the mainland for school goal accomplishment (quality teaching and learning). Drawn from the interviewees' viewpoints, the school system theory has a potential to give the whole organisational structure, a dynamic functioning strength deriving from well interrelated parts. Thus, in the South African school contexts, the systems theory glues schools to their interconnected parts.

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[18] chief management statutory body for schools as organisational systems (principal, deputy principal, departmental heads).

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The practice of social security in black Africa: a shadow of the real concept: The Cameroonian transcript.

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Abstract

Social security is a corner stone for the socio-economic and even political development of many countries in the world today. Developed countries like Germany, Britain and many western countries have developed and made use of theories propounded by founders of the concept of social security like Otto von Bismarck and Lord Beveridge to develop their societies. But the unfortunate thing is that all along their stay in Africa, these colonial powers did not border to institute and impregnate Africans with the concept, thus, living Africans completely ignorant of the concept of social security. Studies have proven that the application of this concept in Africa, especially south of the Sahara is still a nightmare. Africans are unable to put into place a veritable social security scheme, yet most of them aspire to emerge by 2035. With the example of Cameroon, the causes of this failure are attributed to the colonial masters and poor governance in post-colonial Africa. As a remedy to this situation, results of this research demand that African governments must show prove of good governance and elaborate an inclusive social protection scheme. Besides, specialize United Nations agencies like the International Labour organization (ILO) and the Human Rights Commission must stand by these countries with their technical knowhow to help develop a meaningful social protection scheme in Africa. As an alert to those countries warming up for emergence, it is an illusion if the welfare of these people is not put at the center of every development action.

Key words; Africa, Cameroon, Social security, colonial, post-colonial, International Labour Organization, Human Right Commission.

Introduction

Before we dive into the way this concept of social security is applied in black Africa, it is important to first of all look at terminologies that constitute this concept. They are social and security. According to Ikomey Greg, an expert in the administration of social security, **"Social"** is anything that has to do with the society and its various components like man and the environment[1]. On the other hand, the French dictionary "*Petit Robert 1*" as sited by Albert Ndjala Voundi holds that the word **"Security"** comes from a Latin word

[1]Ikomey Greg, "Introduction to social security*",* First year course, Advanced Regional Institute of Social security-(IRESSS), Yaounde, 2010, p. 1.

"*Securitas*" which means "sure". Therefore, by this dictionary, security is defined as a calm and confident state of mind of someone who is conscious of the danger(s) around him or better still as someone's tranquility because of the absence of danger, or simply the absence of the risk of accident[2]. On its part, the ILO in its Convention No. 102 of 1952, define social security as all the mechanisms put into place by the State to ensure social protection of its people against eventualities which threatens salaries, revenues and living conditions like illness, maternity, industrial accidents and occupational diseases, unemployment, invalidity, old age and death, including the provision of medical care and family allowances[3]. It was noticed in the course of this research that this concept is an instrument for development and economic growth, high standard of living and long life span in the western world. Unfortunately, the concept is not given a pride of place in Africa. Meanwhile, Africans are languishing in abject poverty and total insecurity. Today many of these countries have as a slogan social security but in reality, what is applied on the field does not reflect the minimum recommendations of the ILO. Therefore, with Cameroon as our case study, the objective of this paper is to x-ray this scheme, write its wrongs and proposed the way out so as to trigger social development and possibly the emergence of this continent.

I. International prescriptions vis-à-vis the minimum standard of social security.

Social security is a human right that must be protected and this responsibility is attributed to various governments under the supervision of international institutions like the Human Rights Commission and the ILO. Therefore, to better appreciate the level of implementation of this concept in Africa, Cameroon included, it is important reviewing the norms laid down by the above specialized agencies of the United Nations Organization (UNO).

I.1. The Human Rights Commission and its exigencies for social protection.

The Commission on Human Rights was created in 1946 is one of the United Nations' organs charged with the protection of the right of man. This commission came out with the Universal Declaration of Human rights in December 10, 1948 which clearly spelt out human rights[4]. Some of the human rights envisaged in this declaration are;

Article 23;

(1) Everyone has the right to work, to free choice of employment, to just and favourable conditions of work and to protection against unemployment.
(2) Everyone without any discrimination has the right to equal pay for equal work.
(3) Everyone who works has the right to just and favourable remuneration ensuring for himself and family an existence worthy of human dignity, and supplemented, if necessary by other means of social protection.
(4) Everyone has the right to form and to join trade unions for the protection of his interests[5].

[2]Ndjala Voundi Albert, "Connaissance de L'entreprise et bases de la prévention des risques professionnels; Course de perfectionnement des cardes en sécurité et santé au travail", IRESSS, Yaoundé, 2010, p. 3.
[3]International Labour Conference, Convention No. 102, concerning minimum standards of social security, 1952, pp. 3-4.
[4] United Nations Organization, *Basic facts about the United Nations*, United Nations department of public information, New York, 1995, p. 193.
[5] United Nations Organization, *Universal Declaration of Human Rights*, New York, United Nations department of public information, 1988, p. 12.

Article 24

Everyone has the right to rest and leisure, including reasonable limitation of working hours and periodic holidays with pay.

Article 25

(1) Everyone has the right to a standard of living adequate for the health and wellbeing of himself and of his family, including food clothing, housing, medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control.

(2) Motherhood and childhood are entitled to special care and assistance. All children whether born in or out of wedlock, shall enjoy the same social protection[6].

To add more impetus, the ILO regrouped social benefits into different branches.

I.2. Prescriptions of the ILO.

The ILO previewed nine different universal branches of social security to be upheld by member countries for the prosperity of their citizens. There are as follows;

- Preventive and curative medical care.
- Sickness benefits in case of cessation of work due to diseases.
- Unemployment benefits.
- Old age benefits.
- Benefits related to industrial accidents and occupational diseases.
- Family benefits.
- Maternity benefits.
- Invalidity benefits.
- Survivors benefits[7].

With the above benefits in mind and given the different economic potentials of countries, the ILO exalts every government to operate branches of social security within its reach to ensure the economic and social empowerment of its people. But that has not been the case in most African countries. Even Europeans who propounded and were effectively applying this concept in their countries failed to induct Africans into it. Studies carried out in Cameroon, attributed the genesis of the poor state of the social security scheme in Africa to these colonial masters. The colonial scheme put into place in this continent had no resemblance with that put into place in the western world nor did take into account the articles and branches seen above. To prove this accession it is imperative to take a look at the so called colonial social security scheme in this country.

II. The practice of social security in Cameroon (1939-1961)

Here, we are going to examine the functioning of this scheme during the colonial and post-colonial period.

[6] Ibid. p. 13.

[7] International Labour Organization, *Governance of social security systems: a guide for Board members in Africa,* Turin-Italy, International Training Center, 2010, pp. vii-viii.

II.1. The bias and ill adapted colonial Social protection scheme.

At this point, our research is axe on the British and French social protection schemes in British and French Cameroons respectively during the mandate and trusteeship eras. With respect to the British approach to social security in Cameroon and all its spheres of influence, the colonial administration did not place any emphasis on the welfare of colonial subjects despite articles IV and XXII of the League of Nations which stressed the need for better working conditions for colonial people[8]. Failure to respect these articles, those of the Human right and the ILO and persistent poor labour conditions and low wages led to the creation of pressure groups like the Cameroon Welfare Union in 1939. Led by its founder, G.J. Mbene, this mixed group of students, elites and later plantation workers, mounted pressure on the British colonial administration. The end result was the passing of circular No. 20/1939, by S.R. Marlow, the acting financial secretary in Lagos, creating the Government Servants' Provident Fund on the 1st of June, 1939 as seen in the following except; "With reference to circular No. 5/1939 of 1st of February 1939, I am directed by the Governor to inform you that the Government Servants' Provident Fund Ordinance No. 12 of 1939 has now been enacted and it is proposed that it shall be brought into force on the first of July, 1939…"[9].

According to article 1 of this ordinance, the fund was to take care of only Government servants as seen in the following table[10].

Table 1: Membership of the Government Servants' Providence Fund (1939-1942)

No.	Name	Designation	Account number	Amount contributed (£.s.d.)	Division
1	Sylvester Keka	Unqualified Interpreter	41/20	0. 4. 0.	Bamenda
2	J. Kisob	″	41/22	0. 5. 6.	″
3	Chinda	Messenger	42/103	0. 2. 6.	″
4	Hammah	″	42/162	0. 2. 6.	″
5	Dinga(u)	″	42/168	0. 2. 6.	″
6	Ngundu	″	42/179	0. 2.6.	″
7	Chibi	″	42/180	0. 2.6.	″
8	Ayong	″	43/203	0. 2.6.	″
9	Abanda	″	43/204	0. 2.6.	″
10	Tumita	″	43/206	0. 2.6.	″
11	Tum	″	43/245	0. 2.6.	″
12	Tinay Kima	Unqualified Interpreter	41/21	0. 5.6.	Mamfe
13	Awuno	Messenger	42/102	0. 5.0.	″
14	L.A. Beeching	″	42/115	0. 2.6.	″

[8] Emmanuel Aloangamo Aka, *The British Southern Cameroons, 1922-1961; A study in colonialism and underdevelopment*, Plattevillee-Madison, Nkemji Global Tech, 2002, p. 38.

[9] BNA, Sc/1939/1: Provident Fund Ordinance of government servants

[10] BNA, Sc/1942/1, Government Servants' Provident Fund, circular No. 250/229, Buea, April, 1942.

15	Ekumo	″	42/137	0. 2.6.	″
16	Esakenong	″	42/142	0. 3.9.	″
17	Fonka	″	42/146	0. 3.9.	″
18	ForkuMawfaw	″	42.189	0. 2.6.	″
19	AbiaNdah	″	42/199	0. 7.6.	″
20	Martin Eben	″	42/133	0. 2.0.	Kumba
21	T. Ebong	″	42/134	0. 2.0.	″
22	Odi	Unqualified Interpreter	41/29	0. 5.0.	″
23	Makia	Messenger	42/185	0. 2.0.	″
24	Mukwelle	″	42/190	0. 2.0.	″
25	B.T. Etande	Messenger	42/143	0. 3.9.	Victoria
26	Peter Njoh	″	43/207	0. 3.9.	″
27	A.E. Nganda	Unqualified interpreter	41/27	0. 5.0.	″
28	H.K. Robert	Messenger	43/229	0. 3.9.	″
29	Oscar Songe	″	43/236	0. 3.9.	″

Source: Sc/1942/1 Government servants' Provident Fund, Circular No. 250/229, Buea, April, 1942.

From the above table for example, only about 29 workers were registered into this fund. Besides, just two categories of African workers in the Government Servants' Provident Fund: messengers and interpreters. What became of others categories of workers like teachers, public works and many other sectors? We equally observe that this fund considered workers of a certain class; only workers whose salaries were at least £24[11]. The entire local auxiliary staff to the British administration in the Cameroons could not be just 29 workers as in the enrolment of the Provident Fund. Where was the League of Nations to question the colonial administration?

However, since blacks had to hold Europeans with force to obtain the amelioration of their social conditions, revandications continued almost all British occupied territories. Consequently, this led to the setting up of the Royal Commission to investigate the causes of riots in British colonial territories. According to reports from this commission, colonial people were not happy with the level of social rights, development and welfare in the British colonial empire.

But instead of creating an enlarge and inclusive fund, the British colonial authority passed the Colonial Development and Welfare Fund Act in 1940, creating the Colonial Development Welfare Fund (C.D.W.F.) for Africans. This fund was to annually give financial assistance to the tune of £1000, 000 per territory for ten years, to finance economic and social development projects in British spheres of influence[12].

[11] Sc/1942/1 Government servants' Provident Fund, Circular No. 250/229, Buea, April, 1942.

[12] Emmanuel Aloangamo Aka, *The British Southern Cameroons, 1922-1961; A study in colonialism and underdevelopment*, Plattevillee-Madison, Nkemji Global Tech, 2002, p.173.

British Cameroon being part of this British colonial empire was not left out of these benefits. Between 1946 and 1951, the Colonial Development and Welfare Fund grants to British Cameroons amounted to about £548,557, representing a per capita of about seven shillings and four pennies[13]. It is true this was going to ameliorate the social conditions of the people, but all the social developments brought by this fund were concentrated in cosmopolitan centers at the heart of British economic interest. In the case of Cameroon, emphasis in social development based in Kumba, Buea, Victoria (Limbe) and many others to ameliorate the living conditions of plantation workers, with little or no impact felt by those in the peripheries.

The same scenario continued with the creation of the Cameroon Development Corporation (CDC) in 1947. Agitations of the Corporation's workers led to the creation of another Provident Fund. But still, a bulk of the work force was kept out of this Fund as one will notice in the following table.

Table 2: C.D.C labour and Provident Fund numbers from 1947 to 1961

YEAR	SENIOR SERVICE	INTERMEDIATE SERVICE	JUNIOR SERVICE	FIELD WORKERS	ANNUAL TOTAL NUMBER OF WORKERS	PROVIDENT FUND NUMBERS	WORKERS LEFT OUT OF THE PROVIDENT FUND
1947	40	0	344	16,262	**16,646**	**384**	**16,262**
1948	74	0	368	17,542	**17,984**	**442**	**17,542**
1949	114	8	736	18,714	**19,572**	**888**	**18,684**
1950	141	34	615	18,356	**19,146**	**790**	**18,356**
1951	153	36	720	21,789	**22,698**	**909**	**21,789**
1952	156	31	888	24,494	**25,569**	**1,075**	**24,494**
1953	198	26	1,131	23,813	**25,168**	**1,355**	**23,813**
1954	220	36	1,141	25,030	**26,427**	**1,397**	**25,030**
1955	229	44	1,236	21,664	**23,173**	**1,509**	**21,664**
1956	187	40	1,082	16,671	**17,980**	**1,309**	**16,671**
1957	186	37	1,128	16,644	**17,995**	**1,351**	**16,644**
1958	191	34	1,118	17,349	**18,692**	**1,343**	**17,349**
1959	190	27	1,136	15,122	**18,691**	**1,353**	**17,338**
1960	154	28	1,076	16,364	**17,622**	**1,258**	**16,364**
1961	144	31	1,027	16,034	**17,236**	**1,202**	**16,034**

Source: Charles Nda Agbor, "The practice of social security in British Southern/west Cameroon(s) 1939 -1972", Thesis submitted for the award of a Doctorate/Ph.D in History, University of Dschang, February 2019, p. 136.

[13]Ibid, p.175.

Like the Government Servant Provident Fund, a close look at the table above depicts that not all the workers of this Corporation were members of the fund. Only the junior, intermediate and senior service workers that constituted the administrative staff were admitted into the Fund. Generally, it was those with a degree or its equivalent from a recognized university that were accepted for direct entry into the senior service; a diploma or its equivalent from a post-secondary institution for qualification into the intermediate service and a secondary school certificate was the basis for entry into the junior service as a clerk[14]. How many Cameroonians were qualified for these ranks? So to say, those holding these positions were mostly foreigners, especially Nigerians.

On his part, Ngongo Louis made it clear that the most important criteria for recruitment into the colonial administration or to have social protection was to must have formal professional training in colonial institutions in England in the case of Great Britain[15]. Does the right to social protection demand any educational background? What became of article 3(3) of the human right declaration? Where was the Human Right Commission? Yet, it was those left out of the fund that carried out most of the tedious jobs and vulnerable as can be seen in the picture below.1

Picture1: The construction of roads and bridges in the Bafut Fondom

Source: Annual report for the Cameroons under the United Kingdom trusteeship for the year 1953, p. 203.

[14]Ibid. p. 146.

[15] Louis Ngongo, *Histoire des institutions et des faits sociaux du Cameroun 1884-1945*, Tome 1, Paris, Berger-Levrault, 1987, p. 122.

Picture 2: Loading of banana at the Tiko wharf

Source; Annual report of the C.D.C. for the year 1948, p. 2.

From the pictures above, the working conditions of this people are glaring, there were very horrible, yet without any social protection. As compensation to Africans, the colonial administration introduced the retiring gratuities and ex-gratia gratuities. Retiring gratuities were benefits offered to employees who had served the colonial administration continuously for a minimum of five years and was forced to go on retirement as a result of old age or infirmity. On the other hand, ex-gratia service gratuities were given to longest serving and high productive employees at retirement[16]. To be a beneficiary of any of the above gratuities was not an easy task because looking at the risky nature of jobs, it was not easy for one to work for five years which was a condition of eligibility. Secondly the employee must have being approved by the Governor and must have been assiduous with an encouraging output. No family allowance was given to this people[17].

In French Cameroon, the situation was not different. Just like pressure for the social welfare of colonial people was mounted on the British colonial government, so too was the case in French Cameroon. The introduction of this concept in French occupied territories in Africa was not a voluntary will of the colonial administration. It was as a result of pressure from French oversea workers in Africa for equal social rights with their compatriots back home which obliged the French colonial government to introduce this concept in Africa.

To that effect, there was the creation of *"Caisse d'Allocation Familiale des Expatries (CAFÉ)"* 1945. This fund was to grant family allowance to French oversea citizens in Africa in general and Cameroon in particular. It is worth mentioning that Cameroonians workers like in most French colonies were not part of this social justice. However, the creation of this fund insinuated both internal and external revandications that led to the closure of CAFÉ and the creation of another fund called *"Caisse de Compensation des Pestations Familiales" (CCPF)* in 1956. This one envisaged family allowance to both French and African workers[18]. Even at this level, we found out that the French colonial government limited the concept of

[16]Annual report of the C.D.C. for the year 1952, p. 16.
[17] Ibid.
[18] Michel Berenger Teku Ngunewou, *"La sécurité sociale au Cameroun (1945-1990): Tendances enjeux et perspectives" Mémoire de Master en en Histoire, Université de Dschang, 2008, p. vi.*

social security to only family allowance, destined only to workers. The same questions of what became of other branches of social security like preventive and curative medical care, sickness benefits in case of cessation of work due to diseases, unemployment benefits, old age benefits, benefits related to industrial accidents and occupational diseases, maternity benefits, invalidity benefits and survivors benefits upheld by the 1952 ILO convention? And what became of non-workers? Keeps coming up.

Looking at the above situation, it is clear that the introduction of the concept of social security in Africa was exclusively for the colonial administration which according to Victor Julius Ngoh was made up of the Governor, General Secretary, Cabinet Director, Heads of services, members of the administrative council and very few employees[19].

Social security is also about the education and the health of the population. But even the meager education and health facilities put into place were not meant for Africans but for European personnel. In French Cameroon following arrête of 27 December 1933, the French colonial administration set up schools only for sons of chiefs in Yaounde, Garoua, Dschang and Doume. The major goal being to train future chiefs to respect all what was French and promote the French mission in Cameroon while acquiring the technics of administration[20]. Though this government by 1939 had some regional schools and an advanced primary school in Yaounde and Douala, most of educational developments in the territory were done by missionaries. For example, in 1937, there were about 85000 pupils in mission elementary schools under the Catholic mission, the French protestant mission, the American protestant mission, the American Adventist and many others[21].

In English speaking Cameroon, education was also abandoned in the hands of native authorities and missionaries. The elementary education provided by the colonial administration was intended to train civil servants and clerks for colonial exploitation while the mission regarded education as a means to propagate the word of God[22]. The curricular included just the teaching of hygiene, agriculture, reading, writing, arithmetic, singing and religious instructions. There was nothing like the education of the local population on their social rights. From all indications, the colonial administration did not see any reason to train administrative auxiliaries more than they needed.

In the field of health, the French opened an institute of hygiene in Douala in 1925, a professional nursing school for the training of nurses at Ayos. In British Cameroon, health services were also abandoned to the native authorities, missions and the CDC. The colonial government merely acted as a guide and adviser. Directed by the Director of medical and sanitary services in Enugu-Nigeria through the Resident in Buea and divisional doctors, the medical team in the territory was ran by only five medical doctors; Dr. F. Ross; medical officer for Victoria and Kumba, Dr. C.G. Grey for Bamenda, Dr. C. Kelsall for Buea and Soppo and Drs. Gibson and Seiner for Mamfe. Meanwhile the population was being ravaged by a good number of epidemic and endemic diseases like sleeping sickness, small-pox, yaws, influenza, dysentery, chicken-pox, malaria and many others[23]. Besides, workers were confronted by a good number of industrial accidents and occupational diseases as presented in the following tables.

[19] Victor Julius Ngoh, History of Cameroon since 1800, Pressbook, Limbe, 1996, p. 133.
[20] Ibid. p. 134.
[21] Ibid. pp.136-137.
[22] Ibid. p. 174.
[23] Ibid. 176.

Table 1: Industrial accidents in British Southern Cameroons, 1949- 1953

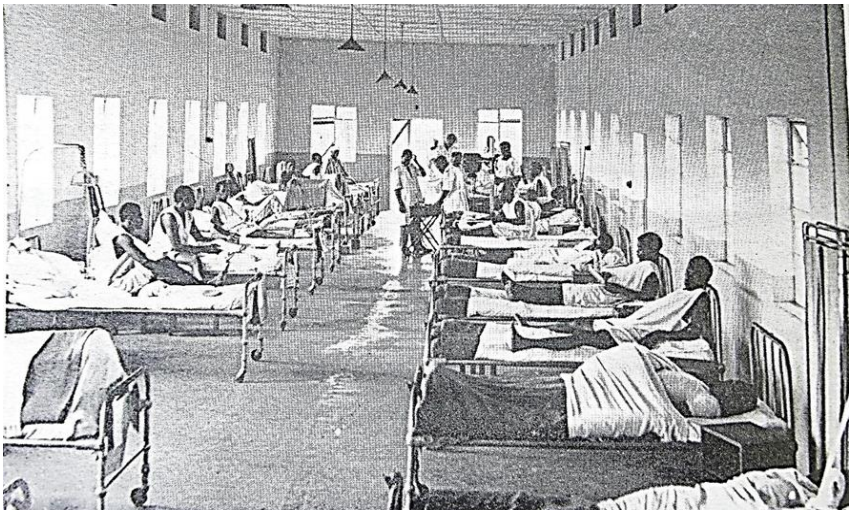
Industrial sector	YEAR					
	1949	**1950**	**1951**	**1952**	**1953**	**TOTAL**
Fatal accidents						
Agriculture	17	8	13	5	7	**50**
Industry, transport & trade	–	–	1	–	–	**1**
Domestic & personal service	–	–	–	–	–	**–**
Timber & forest products	–	–	1	1	–	**2**
Public works	–	3	4	2	2	**11**
Others	1	–	1	–	1	**3**
TOTAL	**18**	**11**	**20**	**8**	**10**	**67**
Non-fatal accidents						
Agriculture	108	152	504	487	3,498	**4 .749**
Industry, transport & trade	7	–	1	3	–	**11**
Domestic & and personal service	–	–	–	–	–	**–**
Timber & forest products	8	–	5	1	–	**14**
Public works	1	–	15	5	8	**29**
Others	–	–	–	–	–	**–**
TOTAL	**124**	**152**	**525**	**496**	**3,506**	**4803**

Source: Annual report on the Cameroons under the United Kingdom Trusteeship for the year 1953, p. 204.

This table portrays the degree of industrial accidents, with the departments of agriculture, public works, timber and forest being the most fertile sectors for these accidents[24]. The reason for this great number of accidents in these domains is simple. There were areas where European laid much emphasis, thus making it the most active and areas of recruitment. This is to confirm the main objective of colonization of Africa which was the exploitation of raw materials. Cameroonians were compelled to work either in the plantations or in any of the above sectors. However, a look at the picture below is testimony of the consequences of the sacrifices and services rendered by Africans to the Whiteman.

[24] Annual report on the Cameroons under the United Kingdom Trusteeship for the year 1953, p. 204.

Picture 3: Victims of accidents and occupational diseases in the Tiko hospital



Source: Annual report of the C.D.C., 1960, p. 28.

While the picture above shows victims of industrial accidents, the following table surfaced the magnitude of occupational diseases.

Table 4: Occupational diseases and patients infected in Southern Cameroons

Illnesses	In-patients cases	Out-patients cases
Tuberculoses	98	170
Dysentery	1091	3552
Malaria	1398	9216
Diseases of eye and ear	325	2730
Bronchitis	626	4482
Pneumonia	796	199
Enteritis and diarrhea	201	200
Hernia	1505	1293
Abortion	280	61
Diseases of skin & cellular tissues	462	2164
Accidental injuries	1927	6781
Worm & Helminthic infestation	186	5394
Chronic rheumatism & gout	266	767

Source: Annual report of the Cameroons under the United Kingdom administration for the year 1959, p. 74.

Statistics from this table, indicates that diseases like dysentery, malaria, eye and ear infections, bronchitis, hernia, skin diseases, accidents and worms were the most ravaging and imposing diseases. All these in violation of international instructions of the Human right commission and the ILO under the umbrella of

the UNO because very little or no medical care was given to Africans. Indeed, Africans paid heavily the price for colonialism.

A proper social security scheme is that which respect the dignity of man as outlined above and constitutes well-structured institutions that manages carriers and professional lives and ensure quality education and health to its community. But this was not the case in many African countries like Cameroon and we strongly believed that this was as a result of the poor colonial social security system put into place. This scheme was very discriminatory and ill adapted and contrary to article 23(3) of the Universal Declaration of Human Rights which demanded for the guarantee of just and favourable remunerations to all workers and families. The attitude of colonialists is what Leon Noah Manga called practical discrimination[25].

Meanwhile as indicated by Jean Jacques Dupeyroux in "*Droit de la sécurité sociale",* social security is a right reserve to all members of a society against risks as indicated in the definition of this concept[26]. Unfortunately, all along their stay in Africa, these colonial powers did not border to accord this right to Africans talk less of instituting a minimum social security system in the territory. These were some of the reasons that triggered the struggle for and the liberation of this continent in the 1960s. To be precise, French Cameroon achieved independence in January 1st, 1961 and British Cameroon in October 1st, 1961[27]. However, after independence and reunification of the two Cameroons in 1961 as well as many other African countries, one would have been expecting a drastic change in the social security of Africans and Cameroonians but this is not the case. At the eve of independence, Africans were completely ignorant of the concept of social security. A situation that later perpetrated in the African approach to this concept at the dawns of independence. Therefore, in our subsequent development we will be looking at the post independent social security scheme in Cameroon, African miniature.

III. The post-colonial social security scheme in Cameroon; a continuation of the colonial scheme

It is true that after independence, the Federal Republic of Cameroon under the stewardship of President Ahmadou Ahidjo saw the urgent need for the social development of this newly independent state as disclosed in the following statement; "Il nous semble donc indispensable que le parti apporte un soin particulier aux problèmes sociaux, agents du développement économique et social ; l'éducation, la sante publique et le service social, la législation du travail seront donc examines comme pôles de développement"[28]. It is true that a good number of initiatives towards this direction were taken. This can be seen in the structural morphology given to this scheme after independent. Social security witnessed institutional and organizational reforms.

III.1. Institutional reforms

The desire for the Federal Republic of Cameroon to have its own national laws as an independent state, break away from outdated colonial social legislations and to adapt the supposed social legislation to the realities of the labour market led to the creation of some specialized institutions[29]. This began with the

[25] Léon Noah Manga, Pratique des relations du travail au Cameroun par l'example et les chiffres, Harmattan, 2010, p. 73.
[26] Jean Jacques Dupeyroux, Droit de la securite, Neuvieme edition, Dalloz, 1984, p. 4.
[27] Victor Julius Ngoh, The world since 1919, A short history, Pioneer publisher, Yaounde, 1989, p. 299.
[28] Ahmadou Ahidjo, Contribution à la construction nationale, Présence Africaine, Paris, 1964, p. 90.
[29] Official gazette of the Federal Republic of Cameroon, September 1st, 1967, (supplementary), pp. 97-98.

creation of the Ministry of labour and social legislations/social insurance which is today is called the Ministry of labour and social security to initiate, regulate and supervised the implementation of decisions geared towards the wellbeing of workers. There was also the creation of the Ministry of public service to pilot careers of civil servants as well as the creation of the National Social Insurance Fund (NSIF) in 1967 to guarantee social protection to workers in private and para public sectors. Each of these institutions was given a befitting operational structure that could upgrade the wellbeing of Cameroonians[30].

III.2. Judicial reforms

The above structures gave birth to a number of legal reforms. Colonial laws on social security underwent a number of modifications and the institution of new ones to suit changing times. One of such laws instituted was Law No. 67-LF-6 of the 12th June 1967 instituting the labour code to govern labour relations between workers and employers[31]. But with the passage of time and the complexity of the job market, this law was amended by Law No. 92-007 of 14 August 1992 fixing the labour code in vigour today[32].

There was also the institution of Law No. 67-LF-8 of the 12th June, 1967, organizing social insurance in the Federal Republic of Cameroon. This law created a number of bodies and services to deal with the various allowances provided by the social and family welfare legislation[33]. Beside the organization of this Fund, a good number of laws and texts creating different social security branches also saw the day. These texts envisaged the nature of social risks to be covered, respective allowances, designated beneficiaries of these allowances and conditions leading to opening of rights. For the first time in this country, the scheme envisaged social benefits in cash and in kind[34].

With respect to benefits in cash, there was the proliferation of laws on family allowance, industrial accidents and occupational diseases and old age, invalidity and dead pension. Concerning family allowance, Law No. 67-LF-7 of 12 June 1967, instituted the family allowance code. This code envisaged the following allowances;

Prenatal allowance

Medical bills

Maternity allowance

Family allowance

Daily indemnities to salaried women at maternity leave[35].

On its part, Law No. 69-LF-18 of 10 November 1969, instituting the old age, invalidity and dead pension regime guaranteed the following allowances;

Old age pension

Old age allowance

Old age pension and old age allowance before due date

[30] Paul-Gérard Pougoue, *Droit du travail et de la prévoyance sociale au Cameroun*, tome 1, Yaoundé, Presses Universitaires du Cameroun, 2000, p.20.

[31] Ibid. p. 100.

[32] Paul-Gérard Pougoue, *Droit du travail et de la prévoyance sociale au Cameroun*, p. 45.

[33] Official gazette of the Federal Republic of Cameroon, September 5th, 1967, (supplementary), p. 169.

[34] Official gazette of the Federal Republic of Cameroon, 7th year, No. 4 (supplementary), 15th September, 1967, pp. 169-170.

[35] CNPS, Recueil des textes de base de la Caisse Nationale de prévoyance sociale, 1979.p.40.

Disablement or invalidity pension
Survivors' pension
Survivors' allowance[36].

With regards to industrial accidents and occupational diseases, consideration for the health of workers began with decision No. 005/MTLS/SS of 19 March 1962, fixing the list of occupational diseases to be indemnified, the procedure and duration for which the employer or the employee must declare an accident or and occupational disease and the conditions of work susceptible of causing these diseases[37]. This was closely followed by Law No. 68-LF-18 of 18 November 1968, fixing the organization and prevention of industrial accidents and occupational diseases. This law also put into place competent services to ensure the prevention and treatment of industrial accidents and occupational diseases. It was also charged to establish statistics on the different cases of industrial accidents and occupational diseases, make investigations on the social, health and hygienic conditions of workers at work and many others[38].

Looking at the above social security branches offered, we must confess that this was the first time Cameroonians and workers in particular were to enjoy such advantages. But what we found out is the fact that very few Cameroonians, even workers themselves know of these social rights. In our first exchanges with the population on the concept of social security, many people thought that it is the deployment of armed or police forces to ensure peace and security in the society.

This ignorance is worst at the level of social contributions, allowances offered and documents and procedures to obtain social benefits. How can someone who does not have any notion of the concept know how to go about it?[39] Meanwhile social contributions regrouped according to the three social security branches in promulgation in Cameroon. According to the dispositions put in place, employers and workers of the family allowance branch were divided into three sectors of occupation and levied different percentages of contributions. There are;

- General regime and house help 7 percent (%)
- Agricultural regime 5.65%
- Private education 3.7%[40]

For the industrial accident and occupational diseases regime, the rates were shared according to the employer (company's) vulnerability to risk. To that effect, these risks have been classify into three groups and given the following percentages of social contributions;

- Group A (low risks) 1.75%
- Group B (average risks) 2.5%
- Group C (high risks) 5%[41]

It is important to note here that be it in the family allowance branch or in the branch of industrial accident and occupational diseases, social contribution is totally borne by the employer, unlike in the old age,

[36] Ibid. p. 120.
[37] MINTRAVAIL, Recueil des textes relatifs à la santé et sécurité au travail, MINTSS/SG/DSST/SDSAT/SNMT, March, 1962, p. 76.
[38] Ibid. p. 48.
[39] Official gazette of the Federal Republic of Cameroon, 7th year, No. 4 (supplementary), 15th September, p. 176.
[40] CNPS, *Guide to social insurance,* Abidjan, L'agence Internationale, 1971, p. 83.
[41] Ibid. pp.83-84.

invalidity and dead pension regime where contributions are divided between the employer and the worker. For old age, invalidity and dead pension, the rate stood at 7%, with the employer contributing the lion's share; 4.2% and the employee 2.8%. Nowadays, the contribution stands at 8.40%, with each party contributing half (4.20%)[42].

Once both parties (the employer and employee) are kid with the above social contributions, the employee and family are open to social benefits in cash and in kind. With regards to benefits in cash, some are; prenatal allowance which stands at 25.200 FCFA. This amount is nine times the monthly rate of family allowance (9 x 2800 FCFA). For maternity allowance, the amount is fixed, 21600fcfa, 2800 FCFA as monthly family allowance per legitimate child. There are also daily indemnities to salaried women on maternity leave. The amount of daily indemnity is the exact salary perceived by a salaried woman at the time of suspension of her labour contract. The duration of this maternity leave is 14 weeks (4 weeks before the presumed delivery date and 10 weeks after). There is also 200 FCFA for medical examination as a result of pregnancy and 1400 FCFA as delivery fee[43].

The above pecuniary rights are those previewed in the family allowance regime. There are also fiscal benefits in the industrial accident and occupational diseases branch. For the victim, there are; the daily allowance, partial permanent disablement annuity, total permanent disablement annuity and the partial permanent disablement allowance. For the rightful claimants, there is the survivors' annuity and an allowance for funeral expenses[44].

The daily allowance is equal to 2/3 of the daily wage of the victim. This is obtained by dividing his average monthly remuneration by 30. The average monthly remuneration is the arithmetic mean of all the wages earned by the victim during the three months prior to the accident or disease after deduction of professional expenses and allowances paid as reimbursement of costs[45].

If as a result of an industrial accident or an occupational disease, the victim suffers from a total permanent disablement, he is entitled to a monthly payment for total disablement equal to 85% of his average monthly remuneration calculated as in the case of the daily allowance. But if the victim suffers from a partial permanent disablement equal to or more than 20%, he is entitled to a periodic payment obtained by multiplying the annuity for total permanent disablement by the percentage of disablement[46].

The victim of an industrial accident or an occupational disease suffering from a partial permanent disablement which is less than 20% is entitled to a disablement allowance equal to ten times the annual amount of the periodical payments corresponding to the degree of disablement of the victim. These indemnities are paid to the victim or to his rightful claimants. In the case of the dead of the beneficiary, this benefit is shared to the rightful claimants as follows;

- Widow or widower 5
- Total orphans 4
- Partial orphans 3

[42] Ibid. p. 83.
[43] Charles Nda Agbor, The ignorance of the nation of social security in Cameroonian establishments: the case of MIPROMALO-Yaounde, A report submitted in partial fulfillment of the requirements for the award of a professional diploma in social security, IRESSS-Yaounde, April 2011, pp. 43-44.
[44] CNPS, *Guide to social insurance,* Abidjan, L'agence Internationale, 1971, pp. 71-72.
[45] Ibid. p. 72.
[46] Ibid. p. 73.

- Each parent or grandparent 2

The rightful claimants are also entitled to an allowance to cover funeral expenses of the deceased victim of an industrial accident or occupational disease. The funeral expenses include: a coffin, transport of the mortal body from where the worker died to his usual residence or to any other place of burial chosen by the family and transport of his family and luggage to his residence[47].

The social security scheme also defrays and reimburses cost required by the state of a victim of an industrial accident or occupational disease. These include medical fees, surgery fees, cost of pharmaceutical products, hospitalization fees, accessory fees (x-ray and laboratory tests), transportation cost from his residence to the hospital, cost for prosthesis, orthopedics, functional rehabilitation and vocational rehabilitation or readaptation, where applicable, transport cost and living expenses of the person accompanying the victim if his state of health require such assistance[48].

With respect to benefits in kind, this scheme also made provision for health and educational facilities. The State under the President Ahmadou Ahidjo (1960-1982) and Paul Biya (1982 till present) pledged to carry out major reforms in these domains. According to Ahidjo, education is one of the pillars for development and must be given a booster to foster the socio-economic and political development of Cameroon as indicated in the following except; *"It convient donc de faire de l'éducation une pièce essentielle générale du développement afin ne s'opposent les investissements humains et les investissements et activités directement productifs[49]"* To that effect, he adopted a five year development strategy to step up health and educational facilities to ameliorate the health conditions of Cameroonians.

The first five year development plan (1965-1970) under the helm of Ahmadou Ahidjo led to the construction of hospitals, clinics and health centers. There was at least a hospital in each division[50]. Between 1981 and 1986, President Paul Biya in his own development program gave more impetus on education. His administration opened many secondary, technical, teachers' training schools and universities[51].

These Heads of state have deployed much effort to ameliorate the health conditions and the educational standards of the people, yet this has not been enough to meet up with the expectations. For example, there was one hospital bed for every 337 patients in 1967 and 353 patients for one doctor. By 1977, the situation became worst, with just one medical officer for 16.459 patients. Life expectancy was 39.4 years for males and 42.6 years for females[52].

On its part, the National Social Insurance Fund opened quite a good number of social welfare facilities but limited only to nursery schools in cosmopolitan towns like Yaounde, Nanga Eboko, Douala, Edea, Dibombary, Nkongsamba, Bafoussam, Bangangte, Dschang, Limbe, Tiko, Bamenda, Bertoua, Garoua, Ngaoundere and Maroua[53]. All these is to show the effort deployed by the state vis a vie this scheme.

[47] Ibid. pp. 75-76.
[48] Ibid. p. 71.
[49] Ahmadou Ahidjo, Contribution à la construction nationale, p. 90.
[50] Victor Julius Ngoh, History of Cameroon since 1800, pp. 262-263.
[51] Ibid. p. 302.
[52] Ibid. p. 262-263.
[53] Ibid. pp. 100-101.

From the above analyses, it is true that much effort has been made in the light of social security in Cameroon since the departure of the white man but the fundamentals are still lacking. Much is still to be done. Despite the effort of stakeholders, Cameroonians remain very ignorant about the concept of social security. Results of an earlier research carried out in the Advanced Regional Institute of Social Security proved that workers were very unaware of what social security is all about, talk less of knowing their social rights. Just about 20% of the workers in that company could tell us something about social security. Out of the above percentage, about 15 % claimed never to have benefited anything from it. On the other hand, about 80% of them declared total ignorance about this scheme[54].

IV. Shortcomings and the way forward.

IV.1. Shortcomings.

The application of the concept of security in Cameroon as seen above is full of limitations. The degree of this darkness can be seen in the declaration of the general manager of NSIF, Noel Alain Olivier, Mekulu Mvondo Akame as he affirmed that social security in Cameroon covers just about 10% of the total population[55]. With this, the government still dream of an emerging Cameroon as seen in the following excerpt;

"…Cette vision de l'avenir, celle d'un Cameroun émergent auquel nous aspirons tous, nous l'avions baptisée en 2004 les Grandes Ambitions. Cette vision est en train de devenir une réalité. En effet, toutes les études concernant notre programme de Grandes Ambitions sont réalisées et nous avons obtenu les financements. Les Grandes Ambition d'hier vont devenir les Grandes Réalisations. Et à partir de Janvier 2012, le Cameroun sera transformé en un immense chantier…"[56].

Looking at the primordial role of social security to development, some analysts and economist argued that the President's dream of an emerging Cameroon in 2035 will not come true if this scheme is not given due attention. According to Pius Ottou, a panacea for the emergence of this country in 2035 is the wellbeing of its citizens as mentioned in the following quotation; *"… C'est bien beau de parler du développement économique, comment peut-on y parvenir avec des citoyens mal assurés au plan social?…"*[57].

To beef up this idea, Joseph Blaise Meye affirms that social security is a veritable yardstick for any emergence. According to him, no social security, no development as he declared that *"Le vrai critère de réussite d'une société moderne est l'extension de sa sécurité sociale, sa capacité à ne pas exclure et à préserver la dignité humaine"*[58]. Besides the limited scope of this scheme in Cameroon there are also management constraints.

One would have expected that the booster in social infrastructures and new judicial dispensations put into place by the government to lay a bridge to link the masses to social security by opening social security

[54] Charles Nda Agbor, The ignorance of the notion of social security in Cameroonian establishments: the case of MIPROMALO-Yaounde, p. 54.
[55] Noel Alain Olivier Mekulu Mvondo Akame, "*Le Journal de Promote",* Crtv, Friday, 17 February 2017.
[56] Paul Biya, "Extrait du discours d'ouverture du 3e Congrès ordinaire du RDPC le 15 Septembre 2011, *Une publication du Ministère de l'Economie, de la Planification et de l'Aménagement du territoire,* Le projet de construction du port en eau profonde de Kribi", 2012, p. 2.
[57] Pius Ottou, "*Conférence publique a l'occasion de la sortie des promotions de l'Institut Régional d'Etudes Supérieures en Sécurité Sociale (IRESSS) – Yaoundé*", p.6, Yaounde, 24thAugust, 2011.
[58] Joseph Blaise Meye, Social security administrator and Director of the Advanced Regional Institute of Social Security (IRESSS) – Yaounde, Yaounde, 2010.

training institutions that will train trainees, inserted social security as a course into the national school curricular to inculcate the basics of the scheme into the general public. But that was the case.

One of the challenges of social security in Cameroon has been that of the administration of the concept. The scheme witnessed serious administrative sluggishness due to limited and unqualified personnel in the domain. The fund is managed by civil servants who have little or no knowledge about social security instead of technocrats and labour administrators. Once more, there has been no formal education of the people on what social security is all about. All these has rendered the application of the concept in general and process of acquisition of social rights in particular so cumbersome, thus discouraging the lucky beneficiaries[59].

Though article 3 of law No. 68-LF-18 of 18 November 1968 fixing the organization of the prevention of industrial accidents and occupational diseases ordered for the attribution of scholarships in specialized foreign institutions for the training of employees that were to come back and manage this scheme, but that was not an immediate solution because scholarships were not further coming, and today, there is acute shortage of trained personnel in this sector[60].

Meanwhile, the ILO is clear on the fact that the effective governance of social protection schemes is an essential prerequisite to enhance a better coverage and protection. No system of social protection can achieve its objectives without good governance on the part of persons supervising and managing social security schemes.[61]

Furthermore, there is the absence of very important branches of social security in Cameroon. The ILO Convention No. 102 on minimum standards of social security prescripts nine branches of this concept as seen earlier. But neither of the governments (the colonial and the post-colonial) has ever complied with all these branches. Though the post-colonial social protection scheme regrouped the nine branches into three, the branch of universal health insurance, and that of unemployment has never been implemented[62]. With regards to voluntary insurance, though previewed in Article 3 of Law No. 69-LF-18 of 10 November 1969 instituting the Old age, invalidity and dead pension, it had to wait for about 45 years for it to see the day. It was on the 3rd of November, 2014 that voluntary insurance became operational. We however regret the fact that more than 98% of the population are not aware or master the rules of the game[63].

The reasons for the absence of these branches are tied to a weak economic development, a weak legislative and regulatory framework, limited supply of health facilities, the complexity of sicknesses and in the management of these branches and the very high cost involved in the running of these branches[64].

Besides living out some branches of social protection, the application of social security in Cameroon is limited in its scope of coverage. Texts on social insurance in the country before 2014 focused only on workers; senior, intermediate and junior categories in case of the colonial Provident Fund and employees governed by article 1 of the 1967 labour. Therefore, non-workers and self-employed personnel and families

[59] Charles Nda Agbor, "The practice of social security in British Southern/west Cameroon(s) 1939 -1972", Thesis submitted for the award of a Doctorate/Ph.D in History, University of Dschang, February 2019, p. 271.
[60] MINTRAVAIL, *Recueil de textes relatifs à la santé et sécurité au travail*, MINTSS/SG/DSST/SDSAT/SNMT, p. 48.
[61] International Labour Organization, *Governance of social security systems: a guide for Board members in Africa,* pp. vii-viii.
[62] International Labour Conference Convention No. 102, p. 32.
[63] Charles Nda Agbor, "The practice of social security in British Southern/west Cameroon(s) 1939 -1972", p. 263.
[64] Ministère du travail et de la sécurité sociale, *Document de synthèse de la stratégie de développent de sous-secteur travail et sécurité sociale*, pp. 59.

had little or nothing to do with the social protection scheme. Meanwhile the Universal Declaration of Human Rights in its article 22 made it clear on the that everyone has the right to social security[65].

Another feature of social security in Cameroon is discrimination. Articles 22, 23, 24 and 25 of the Universal Declaration of Human Rights were never applied. Most workers, especially those of the private and para public sector are deprived of their social rights. The table below can better paint a picture of the situation.

Table 5: C.D.C. labour and Provident Fund numbers from 1962 to 1972

Year	Senior service	Intermediate Service	Junior service	Field workers	Annual Total	Provident fund numbers	Workers left out of the provident fund
1962	143	32	999	14,399	**15,573**	**1174**	**14,399**
1963	119	54	1,046	11,279	**12,498**	**1219**	**11,279**
1964	131	75	468	11,637	**12,847**	**674**	**12,173**
1965	134	68	467	11,575	**12,785**	**669**	**14,399**
1966	135	63	505	10,507	**11,698**	**703**	**10,995**
1967	148	63	587	10,496	**11,836**	**798**	**11,038**
1968	156	65	1,110	11,389	**12,720**	**1331**	**11,389**
1969	155	71	1,123	13,566	**14,915**	**1349**	**13,566**
1970/71	177	69	617	13,387	**14,731**	**863**	**13,868**
1971/72	176	95	548	12,079	**13,350**	**819**	**12,531**

Source: Charles Nda Agbor, "The practice of social security in British Southern/west Cameroon(s) 1939 - 1972", Thesis submitted for the award of a Doctorate/Ph.D in History, University of Dschang, February 2019, p. 173.

From the look of things, this fund did not change any great deal from the defunct colonial fund as many workers continue to be excluded. Only the minority; that is the junior, intermediate and senior workers benefited from this fund, at the detriment of the mass field workers.

The scenario remains the same even today. Results of the National Labour Observatory carried out in the East, South and Center regions of Cameroon in 2012 shows that, out of 600 companies visited, 271 do not have workers representatives, 66 were not registered in the NSIF. The number of industrial accidents and occupational diseases is alarming[66]. From the above analysis, one can easily conclude that the social protection scheme in Cameroon is very unjust because those who do the most tedious jobs are left out in favour of the executive class.

This research also noticed that civil servants have an advantage and possibility to have access to social security than those of the private sector. Once a civil servant, the worker is immediately integrated into the national social scheme, though to obtain social benefits is another uphill task. But this is not the case for a

[65] United Nations Organization, *Universal declaration of human rights*, New York, United Nations department of public information, November 1988, p. 7.

[66] Elise, Ziemine, "271 entreprises sans délégué du personnel", *Cameroon tribune* No. 10130/6331-38 of Friday, 6th July, 2012, p.15.

worker in the private sector who will need many years to convince or not his employer to register him in the NSIF. Worst of all, these workers are not informed of the fact that the employer has a maximum of eight days to register them at the social insurance fund, failure to do so, the employee has the right to get himself registered with the fund. But giving the precarious nature of the labour market in this country, how many workers will be courageous enough to by-pass his employer who is sure to dismiss him immediately and get himself registered in the Fund?

To better apprehend this situation, Monique Aimée Mouthieu in her presentation on theme *"Heurs et malheurs du travailleur atteint d'une maladie non professionnelle",* lamented that the development of social security in Cameroon is facing enormous challenges. The first of it being the fact that only 10% of the total population of about twenty-two million is covered by this scheme, living out 90%. Even within this percentage, the majority are employees of the public sector[67]. According to this author, the difficulties encountered in processing documents for social benefits and or obtaining these benefits have pushed many workers of the private sector to show very little interest to getting themselves insured. Some even collaborate with the employee to avoid their registration into this fund.

"Beaucoup de catégories de personnes ont, en fait, été exclues de la couverture car leurs conditions d'emploi diffèrent de celles du secteur structuré. Cela s'est fait à l'initiative de leur employeur, qui peut chercher à réduire les coûts de la main d'œuvre, ou au moins avec l'accord du travailleur qui est soucieux de maximiser son salaire net"[68].

It was also discovered that the deplorable salary situation in Cameroon with the Inter Professional Minimum Salary (SMIG as abbreviated in French) being 36,270FCFA, many workers prefer to connive with their employers to evade social contributions, part of which is to be deducted from their salaries. This is either by not being registered in the NSIF or by declaring very low salaries in the Fund to minimize social contributions. This is probably why many Cameroonians want at all cost to become civil servants[69].

A flash back on the pictures of conditions of work and labour statistics both in colonial and post-colonial Cameroon and a look at the ILO prescriptions on social security shows that the practice of social security on the field is completely a different ball game. Though the country has elaborate quit a good number of texts governing this concept, but the issue at stake is its application. There is no equal pay for equal work in Cameroon. Some workers, especially Europeans were paid higher than Africans though on equal work. With regards to the right to trade unions, attempts to create these institutions were cracked down by colonialists. In the place of social security, there was total insecurity. These people were exposed to very high professional risks, endemics, pandemics and poor conditions of work. Therefore, the right to decent work which is based on three pillars; the right to work, the right to social protection and the right to social dialogue were baffled and refused to the people[70].

According to Anthony Ndi all these were completely against article 2 of the 1962 constitution of the Federal Republic of Cameroon which proclaimed the country's adherence to the fundamental freedoms inscribe in

[67]Monique Aimée Mouthieu, Colloque sur "*La protection des populations contre les risques sociaux en Afrique Sub-saharienne*", salle des Actes, Université de Yaoundé II Soa, 13 et 14 Janvier, 2016.
[68]Ibid.
[69] Charles Nda Agbor, The ignorance of the notion of social security in Cameroonian establishments: the case of MIPROMALO-Yaounde, p. 31.
[70]Ministère du travail et de la sécurité sociale, *Document de synthèse de la stratégie de développent de sous-secteur travail et sécurité sociale*, p. 30.

the Universal Declaration of Human Rights and the United Nations' charter. Indeed the rights of Cameroonians were and are trampled upon as they have no choice of employment, health, education and many other social rights[71].

However, all along, we expected to see the ILO intervene to make sure its prescriptions are respected but that has not been the case. It is regrettable because if it aim is really to promote social justice for workers the world over, formulate international policies and programs to help improve working conditions, set international labour standards in areas of freedom of association, wages, hours and conditions of work, workers compensation, social insurance, industrial safety among others, then this structure must be able to see that its conventions are implemented on the field[72]. It is true that the United Nations paid some visits in British Southern Cameroons to witness the labour conditions of the people but little or no fruit came out of it because this institution did not take any major action to push the colonial administration to ameliorate the living conditions of this people. This is giving the impression that these texts on social rights are reserve only for some supernatural people. With the above stage of this concept, something needs to be done.

IV.2. The way forward

There is an urgent need for the revival of social security in this continent in general and Cameroon in particular. This is by;

- To do this, good governance is the first prerequisite in order to give credibility to the social security scheme.
- Extending social security coverage to all especially vulnerable groups such as women, children and people with disabilities.
- The ILO constituents in Africa must supervise and train experts that will ensure technical management as indicated by Epee Kotto Mouyema Honoree Denise, assist in the development of programs which will extend social security coverage and thus directly address the need to reduce poverty[73].
- Identification of priority social security needs and sources of financing.
- Review of the respective roles of government, the private sector, employers, workers, civil society in providing social protection.
- Devising relevant social security schemes for the informal economy and those living in rural areas.
- Gathering and disseminating best practices and models of innovative and effective strategies used to reach out and organize workers in the informal economy.
- Setting up mechanisms for the effective participation of trade union organizations in the informal economy in the process of social dialogue relating to social security.

[71] Anthony Ndi, *Southern West Cameroon revisited 1950-1972: Unveiling inescapable traps, A tale of international conspiracies and treachery, vol. one. Bamenda, Paul's press, 2013*, p. 30.

[72] United Nations Organization, *Basic facts about the United Nations*, p. 274.

[73] Epee Kotto Mouyema Honoree Denise, La gestion d'un organisme de sécurité sociale, les cahiers du manager, Yaoundé, Imprimerie Nationale, 2011, p. 27.

- Developing programs which link social security extension with other ILO social protection and employment programs in order to develop integrated programs and decent work principles for workers in the informal economy throughout Africa[74].
- Partnerships will be sought with other international organizations and with donor agencies. In order to encourage support for this initiative, the ILO and its tripartite constituents will educate donor countries and international organizations on the challenges of extending social security coverage in Africa, while at the same time it will build a framework for channeling resources and expertise into a coordinated program of action to increase levels of coverage across Africa. It will also assist the donor community in achieving effective targeting of resources for the purpose of extending coverage on a country by country basis.

CONCLUSION

Social security in Africa and Cameroon in particular is bias. It does not follow the foundation for the minimum standard of social security and human rights as laid down by international organizations like the ILO and the Human Right Commission. This scheme if it exist in some countries, considered only a minority of workers (white collar workers). Health and educational facilities far beyond the need of the people, concentrated only in cosmopolitan centers and adapted only to colonial needs. Though the independence obtained in the 1960s brought about new structures to enhance social security, but the post-colonial scheme remain a continuation of the colonial scheme in that there is still the absence of some branches like the universal health coverage, unemployment and voluntary insurance. The scope of coverage continued to be very limited as it considers only workers, especially those of the public service. The scheme still failed to provide decent working conditions to Africans. Above all, the scheme remained a victim of administrative sluggishness because all texts signed between 1961 are still to be applied. It is for the reasons that we came to a conclusion that social security in Cameroon and many African countries does not conform to the norms of the concept. Most of these governments and States have failed to shunt away from the poor colonial social scheme which many describe as selfish, discriminatory, made for the colons to embrace a meaningful social security scheme that will ensure the wellbeing of all. This has jeopardized the interest of the people vis-a-vie the scheme as well as tie down the socio-economic and political takeoff of this continent because refusing to put minimum social security at the disposal of compatriots, means refusing to trigger development. Therefore, to untie this development, African countries individually and or collectively must ensure good governance that will ensure the extension of social security coverage to all, invest in the training of qualified personnel to educate the masses on social security and guarantee an effectively management of the scheme. These efforts must be accompanied by the ILO. In collaboration with African countries in developing integrated programs and decent work principles for workers in the informal economy throughout Africa, educate these countries on the challenges of extending social security and train experts that will ensure technical management of this scheme. Like Pius Ottou said, if nothing is

[74] Louis Paul Mutaze, Professional risks prevention guide, 7th African day for prevention of employment injury, April 30th 2010, p.7.

done to change the phase of social security in Africa, then the dream for Cameroon many African countries emerging by 2035 will never come true[75].

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[75]Ottou Pius, "Conférence publique a l'occasion de la sortie des promotions de l'Institut Régional d'Etudes Supérieures en Sécurité Sociale (IRESSS) – Yaoundé", Yaounde, 24thAugust, 2011.

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Forage Mass, Tillering, Nutritive Value and Root System of Ruzigrass Inoculated with Plant Growth Promoting Bacteria Associated with Doses of N-Fertilizer

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Abstract

The aim of this study was evaluating the effect of the inoculation of plant growth promoting bacteria (PGPB) in forage mass, tillering, nutritive value and root system of ruzigrass (Urochloa ruziziensis (R. Germ. & Evrard) Crins (syn. of Brachiaria ruziziensis) associated with doses of N-fertilizer. The bacteria inoculated were Azospirillum brasilense Ab-V5, Pseudomonas fluorescens CCTB03 and Pantoea ananatis AMG 521, plus the control treatment (non-inoculated), associated with doses of N-fertilizer (0, 50 and 100 kg N ha^{-1}). The experiment was performed in a randomized block design, in a 4x3 factorial scheme, with four replicates, totaling 48 plots (12 m^2). There were no effects of the PGPB and the use of N-fertilizer on the leaf blade, stem+sheath, forage mass, daily and yearly accumulation of forage mass. The PGPB did not have influence on the density of tillers. The doses of 50 and 100 kg of N ha^{-1} increased the amount of tillers. The AMG 521 strain associated with N-fertilizer provided heavier tillers. There was no effect of the PGPB on crude protein (CP), neutral detergent fiber (NDF), as well as acid detergent fiber (ADF), and in vitro digestibility of the dry matter (IVDDM). The use of 100 kg of N ha^{-1} contributed to an increase in CP and a decrease in NDF. The AMG 521 strain contributed to a smaller diameter of the root. Strains CCTB03 and AMG 521 demonstrated a smaller area, length and root density when associated with the dose of 50kg of N ha^{-1}. In general, the PGPB were not efficient in promoting productive increments in ruzigrass.

Keywords: growth promotion, plant biomass, plant growth hormones.

1. INTRODUCTION

Nitrogen (N) is one of the most required nutrients by plants (Dobbelaere and Okon, 2007). When it is applied, plants have positive responses in terms of production and nutritive value of forage mass (Palmer et al, 2014). However, its use in pasture management leads to an increase in production costs (Guimarães et al., 2011), besides damaging the environment due to the fact that, out of the total of N-fertilizer applied, plants' assimilation barely exceeds 50% (Freitas e Rodrigues, 2010). As for the rest, it ends up being wasted in the system (Van Groenigen et al., 2015).

For that reason, it is indispensable to use more efficient and sustainable agricultural technologies capable of reducing dependence on the use of N-fertilizer. An alternative to mitigate the negative impact of conventional practices for pasture fertilization is the use of plant growth promoting bacteria (PGPB) associated with grasses. PGPB have the ability of N_2 fixation (Sarathambal et al., 2015), and they can promote plants growth by synthesizing hormones, solubilizing phosphate and producing siderophores (Kavamura et al., 2013).

Studies with PGPB associated with tropical grasses started in the 50's, with the isolation and description of *Azospirillum* sp. in sugar cane rhizosphere, by Döbereiner and Ruschel (1958). Since then, other bacterial genera have been isolated and studied with the same potential of bringing benefits to tropical grasses.

Nowadays, it is possible to find studies that present the positive effects of inoculation in grasses, such as the increment of forage mass and the reduction in the need for the support of N-fertilizer in pastures of *Urochloa* sp. (Hungria et al., 2016; Leite et al., 2018; Lopes et al., 2018; Duarte et al., 2020) and *Cynodon* sp. (Aguirre et al., 2018).

Studies on the behavior of PGPB in association with N-fertilizer have been demonstrating that, for bacteria such as *A. brasilense*, the use of high doses of N-fertilizer reduces its effects on grasses productive parameters (Cassán e Diaz-Zorita, 2016), or completely inhibits the plant's response to the inoculation (Ozturk et al., 2003). Yet, in sites where N limits production, the effects of the inoculation are more evident, or when moderate doses of N-fertilizer are used in association with PGPB, we can see the complementary effect of such association with increments mainly in biomass production, as reported by Cassán and Diaz-Zorita (2016).

Nonetheless, since we are talking about studies whose some aspects must be elucidated, the results are still inconclusive, and more data are necessary to support the indication of inoculant tests as a commercial product for tropical pastures.

The development of alternative methods capable of modernizing and enabling pasture production systems, besides studying their effects at different stages of pasture growth, allows understanding the biological responses of forages when associated with PGPB, and serves as guidelines for scientists' decision-making, and further transference of such technology to producers (Mamédio et al., 2020).

In this context, this study aimed to evaluate the effect of the inoculation of PGPB on the production of forage mass, tillering, nutritive value and root system of ruzigrass associated with doses of N-fertilizer.

2. MATERIAL AND METHODS

2.1. Site and experimental design

The experiment was carried out on Iguatemi Experimental Farm, which belongs to the State University of Maringá (UEM), in Iguatemi, city of Maringá, state of Paraná – Brazil (23°25'S, 51°57'W; 550 m a.m.s.l.), from October 2016 to September 2018.

The soil of the experimental area is classified as Dystropheric Red Latosol (Santos et al., 2018). It was collected from the 0-0.2 m depth layer, and presented the following chemical characteristics: hydrogen potential (pH in H_2O) - 5,6; SMP index - =6,6; phosphorus (P-Mehlich) - 10,75 mg dm^{-3}; potassium (K^+) - 0,12 $cmol_c dm^{-3}$; aluminum (Al^{3+}) - 0,00 $cmol_c dm^{-3}$; calcium (Ca^{2+}) - 1,36 $cmol_c dm^{-3}$; magnesium (Mg^{2+}) - 0,59 $cmol_c dm^{-3}$ and base saturation (V) - 39,4%; cation exchange capacity (CTC pH 7.0) - 5,25; organic matter (MO) - 11,8 g dm^{-3}; sand - 830 g kg^{-1}; silt - 30 g kg^{-1} and clay - 140 g kg^{-1}. Acidity correction of the soil was performed with dolomitic limestone, with an increase in base saturation to 50% and incorporation of dolomitic limestone with RPTN = 91% (real power of total neutralization).

The grass species used was ruzigrass (*Urochloa ruziziensis* (R. Germ. & Evrard) Crins (syn. of *Brachiaria ruziziensis*). The experiment was conducted in randomized blocks, arranged in a 4x3 factorial scheme, with four replicates, totaling 48 plots, with 4 x 3 m each (12 m^2).

The bacteria inoculated were *Azospirillum brasilense* Ab-V5 (=CNPSo 2083), *Pseudomonas fluorescens* CCTB03 (=CNPSo 2719) and *Pantoea ananatis* AMG 521 (=CNPSo 2798), plus the control treatment (with no bacteria), associated with three doses of N-fertilizer (0, 50 and 100 kg N ha^{-1}).

The strains are deposited in the *Embrapa Soja* Multifunctional Microorganisms Collection: Diazotrophic and Plant Growth Promoting Bacteria (World Federation Culture Colletion-WFCC#1213, World Data Centre for Microorganisms-WDCM#1054). The bacteria derive from selection programs of PGPB of Embrapa Soja: *Azospirillum brasilense* Ab-V5, selected in Brazil, initially for the culture of corn (*Zea mays*) and wheat (*Triticum aestivum*) (Hungria et al., 2010); *Pseudomonas fluorescens* CCTB03 from the company Total Biotecnologia, and *Pantoea ananatis* AMG 521, isolated in Spain (Megías et al., 2016).

For the inoculants preparation, the strains were cultivated in DYGS media (Fukami et al., 2018) and their concentration was adjusted to 10^8 cells mL^{-1}, obtained from the correlation of growth curves previously obtained by the Culture Collection for each strain and the corresponding optical densities. For inoculation, 15 mL of each inoculum were used per Kg of seeds before sowing. The seeds were dried for approximately 30 minutes at a cool place and protected from the sun. Then we sowed the amount of 10 kg ha^{-1} (culture value of the non-treated seeds of 50%).

One week before sowing, fertilization was performed with the application of 84 kg P_2O_5 ha^{-1} (simple superphosphate 18% P_2O_5), 42,5 kg K_2O ha^{-1} (potassium chloride 60% de K_2O). After seedling emergence, the basal dose of 20 kgN ha^{-1} (urea 45 % of N) was applied in all experimental plots. The incorporation of limestone and fertilizers was done with the use of light harrowing.

When the ruzigrass reached, on average, 35-40 cm of height, it was uniformly cut at 15 cm. The heights were measured with the help of a 1-meter millimetered ruler. After that, the plots received N-fertilizer, according to the treatments (0, 50 and 100 kg N ha^{-1}). The amount of 100 kg N ha^{-1} was divided into two applications, with a 15-day interval.

During the experimental period, climate conditions were monitored, with an average record of rainfall (119 mm), relative humidity (83%) and maximum average temperatures (27°C) and minimum (17°C), as shown in Figure 1.

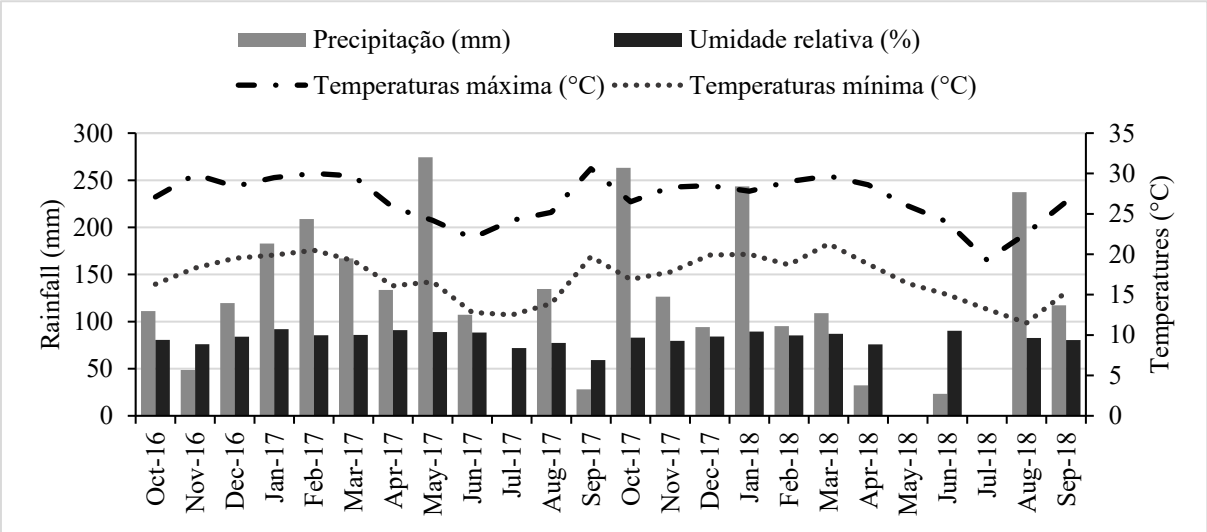

Figure 1. Climatic conditions (rainfall, relative humidity, maximum and minimum temperatures) registered at the Automatic Meteorological Station (FEI-UEM) over the experimental period (October to December 2017 and January to September 2018).

2.2. Measurement of the studied parameters

Cutting management was done based on a light interception (LI) of 95 %. LI was measured with the AccuPAR equipment, PAR/LAI ceptometer®) model LP-80 (Decagon Devices Inc, Pullman, United States). The monitoring of the LI focusing on the forage canopy was performed through the scanning of six random spots per plot every seven days.

After the plot mean reached the expected LI, we randomly collected 10 tillers representing the plot. They were weighed and dried in a stove with forced air circulation at 55 °C for 72 hours and weighed again for determination of dry mass. Afterwards, we randomly collected two samples of forage mass, with cuts at 15 cm of stubble height, by using a STIHL® pruner, model HS 82 R (STIHL, Rio Grande do Sul, Brazil), with the following measures: 0,5x0,5 m (0,25 m²). After obtaining forage mass, we performed uniformity cutting at the same stubble height, in the entire experimental plot.

After harvesting, the material was identified, weighed, and turned into two sub-samples: one for separating the morphological components (leaf blade, stem+sheath and senescent material), and the other for determining dried forage mass. The samples were conditioned in paper bags, weighed and dried in a stove with forced air circulation at 55 °C for 72 hours. Then, it was all weighed again for determination of dry mass and, after that, milled with a stationary "Thomas Wiley" mill adapted with a 2 mm sieve.

Crude protein (CP, g kg^{-1}), neutral detergent fiber (NDF g kg^{-1}), acid detergent fiber (ADF g kg^{-1}) and *in vitro* digestibility of the dry matter (IVDDM g kg^{-1}) were quantified in the leaf blade by Near Infrared Reflectance Spectroscopy – NIRS), (Foss NIRSystems, XDS Rapid Content Analyzer, Denmark).

For the NIRS scanning, we constructed a calibration curve from the laboratorial analytical data of 110 samples, which were analyzed for N using the micro-Kjeldahl method (Tecator, Sweden), and

converted into protein by using the 6.25 factor, according to the methodology described by the AOAC (1990). NDF and ADF were determined in accordance with Van Soest et al. (1991), LIG according to Goering and Van Soest (1970) and IVDDM was obtained in compliance with techniques (traditional methodology) described by Tilley and Terry (1963) and Holden (1999), using a DAISYII artificial rumen (ANKOM™ Technology Corp., Fairport, NY).

For the elaboration of the calibration curve, the samples spectra were scanned by the software ISIScan and exported to the software WinISI III Project Manager 1.50e (Infrasoft International, LLC, 2000, Port Matilda, PA, USA). Reflectance data were stored with log 1/R, with intervals of 2 nm between 700 and 2500 nm.

Principal component analysis (PCA) was carried out before the calibration curves were elaborated by using the partial least squares (PLS) regression model. Then we performed the crossed validation with the software confronting the data from the laboratorial analysis with those estimated by the calibration curve of the NIRS.

After the elimination of the outliers, we used 77 samples for CP, 79 for NDF, 79 for ADF and 71 for IVDDM. For CP, NDF, ADF and IVDDM, respectively, we obtained the following parameters of curve validation: determination coefficient (R^2; 0.99, 0.92, 0.94 and 0.86), cross validation error (SECV; 0.48, 1.43, 0.66 and 4.62%), R^2 corrected by the cross validation error (1-VR; 0.99, 0.88, 0.91 and 0.76), prediction error (SEP; 0.34, 1.03, 0.50 and 3.28) and mean ± standard deviation (X±SD; 12.65±3.33, 51.39±3.73, 24.72±2.12 e 68.54±8.68).

Tillers population density (TPD, tillers.m²) was estimated every 28 days by manually counting the tillers of the plots, considering all the live tillers observed inside the metal frame of 0,5x0,15 m (0,075 m^2), according to the methodology proposed by Sbrissia and Silva (2008). Two representative points were marked inside each plot with a pipe, and the measurements were taken by placing the rectangle at the marked point.

The daily forage mass accumulation rate (dFMA, kg of DM ha^{-1} day) was obtained by dividing the accumulated forage mass by the number of days referring to the harvests interval. The yearly forage mass accumulation rate (yFMA, kg of DM ha^{-1} year) was calculated through the sum of all partial harvests of the experimental period (Barbosa et al., 2007).

Root dry mass (RM, kg ha^{-1}) was determined at the end of each season of the year (autumn, winter, spring and summer), based on the collection of two soil samples with roots in the depth of 0 to 20 cm in each experimental plot, with a steel probe (10 cm of diameter and 50 cm of length), with an opening in the middle to make sample stratification easier. The samples were conditioned in plastic bags previously identified, washed in running water for total soil removal (Soares Filho et al., 2013), weighed and dried in a stove with forced air circulation at 55 °C for 72 hours.

For roots geometry, we withdrew 1 g of roots from the samples after drying for determining root diameter (RDi, mm), root area (RA, $mm^2.dm^3$), root length (RL, mm) and root density (RDe, $mm.cm^3$) by digitalizing the roots with an HP 3400 Scanner, and the images scanning was done by using the software DELTA T SCAN®.

2.3. Statistical Analysis

We used the PROC GLIMMIX from SAS University (Sas Institute Inc. Cary, CA) in all statistical analyses. The variables were initially tested regarding normality (Shapiro–Wilk test). The data were analyzed in a factorial scheme of four treatments, namely control (non-inoculated), *Azospirillum brasilense* Ab-V5, *Pseudomonas fluorescens* CCTB03 and *Pantoea ananatis* AMG 521) x three doses of N-fertilizer, zero, 50 and 100 kg N/ha. We also considered the data from each season as measures repeated in time, and the random effects of the block and year of analysis. The choice of covariance matrix was made by using the Information Criteria by Akaike (Wolfinger, 1993). The means were estimated by using the "LSMEANS", and the comparison was made through the difference probability (PDIFF), using the Tukey test at 5% of significance.

3. RESULTS

There was no effect of interaction between the PGPB and the doses of N-fertilizer for the leaf blade (LB, kg de MS ha^{-1}), stem+sheath (SS, kg of DM ha^{-1}), production of forage mass (FM, kg of DM ha^{-1}), daily accumulation of forage mass (dAFM, kg of DM ha^{-1} day^{-1}) and yearly accumulation of forage mass (yAFM, kg of DM ha^{-1} $year^{-1}$) (Figure 2).

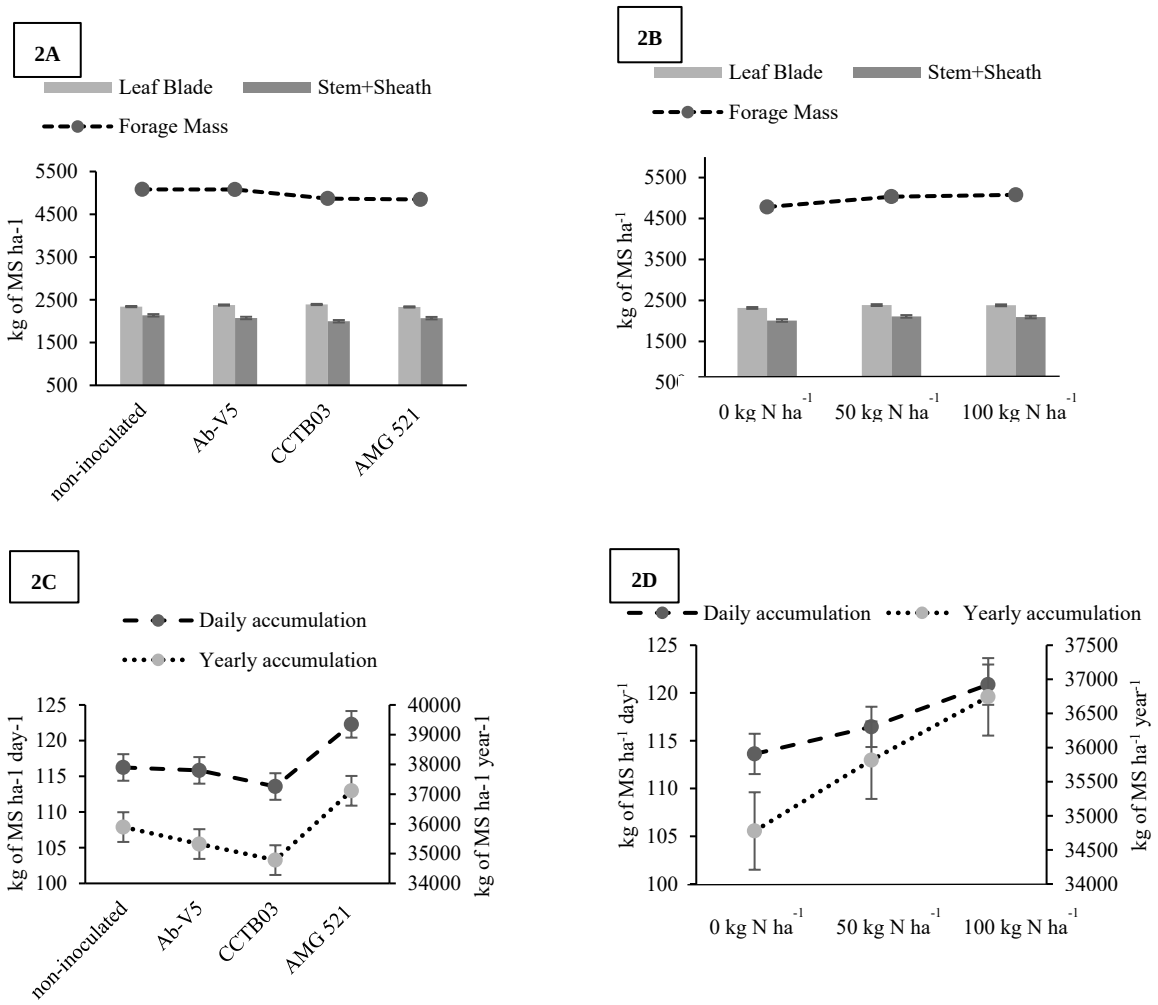

Figure 2. leaf blade, stem+sheath, forage mass (2A and 2B), daily forage mass accumulation and yearly forage mass accumulation (2C e 2D) of ruzigrass inoculated with plant growth-promoting bacteria and N-fertilizer doses.

We did not observe any effects of the inoculation of PGPB strains on these parameters, presenting on average 2367,04 kg of DM ha^{-1} of LB, 2048,15 kg of DM ha^{-1} of SS, 4930,84 kg of DM ha^{-1} of FM, 116,98 kg of DM ha^{-1} day^{-1} of dAFM, 35778,00 kg of DM ha^{-1} $year^{-1}$ of yAFM (Figures 2A and 2C).

Regarding the use of doses of N-fertilizer, there were no effects either, presenting on average 2360,57 kg of DM ha^{-1} of LB, 2070,47 kg of DM ha^{-1} of SS, 4964,61 kg of DM ha^{-1} of FM, 116,98 kg of DM ha^{-1} day^{-1} of dAFM, 35778,00 kg of DM ha^{-1} $year^{-1}$ of yAFM (Figures 2B and 2D).

The interaction between PGPB and the doses of N-fertilizer had no effects on tiller population density (TPD; tillers.m²) of ruzigrass (Table 1). The inoculation of the PGPB strains had no effects on the TPD results, with an average of 1009 tillers.m². Yet, the doses of N-fertilizer presented effects on TPD, with a greater number of tillers ($p = 0,0427$) at the doses of 50 and 100 kg of N ha^{-1}.

Table 1. Tillers population density (TPD, tillers.m²) of ruzigrass inoculated with plant growth-promoting bacteria and N-fertilizer doses

Parameter	Plant Growth-Promoting Bacteria				SEM
	non-inoculated	Ab-V5	CCTB03	AMG 521	
TPD (tillers.m²)	1005	1027	989	1015	79
Parameter	N-fertilizer Doses (kg of N ha^{-1})				SEM
	0	50		100	
TPD (tillers.m²)	973 b	1005 ab		1050 a	78,13

Azospirillum brasilense Ab-V5; *Pseudomonas fluorescens* CCTB03; *Pantoea ananatis* AMG 521. SEM = standard error of mean. Means followed by different lowercase letters in each line are significantly different ($P < 0.05$ Tukey test).

The interaction between the PGPB and the doses of N-fertilizer for tiller weight (TW, $p = 0,0004$) is presented in Table 2. The results showed that, for the treatment group that received only doses of N-fertilizer without the inoculation of PGPB, the tillers were heavier when receiving N-fertilizer.

Table 2. Effect of interaction between plant-growth promoting bacteria (PGPB) and x N-fertilizer doses in tiller weight (TW; g) of ruzigrass

Parameter	non-inoculated	Ab-V5	CCTB03	AMG 521	SEM
0 kg of N ha^{-1}	1,158 B	1,643 A	1,704 A	1,183 B	0,143
50 kg of N ha^{-1}	1,489 A	1,656 A	1,276 A	1,510 A	0,143
100 kg of N ha^{-1}	1,510 A	1,399 A	1,570 A	1,526 A	0,143

Azospirillum brasilense Ab-V5; *Pseudomonas fluorescens* CCTB03; *Pantoea ananatis* AMG 521. SEM = standard error of mean. Means followed by different uppercase letters in each line are significantly different ($P < 0.05$ Tukey test).

The TW values were similar between the Ab-V5 and CCTB03 strains and the doses of N-fertilizer, with an average weight of 1,54 g. For AMG521 strain, the association with the doses of N-fertilizer led to a greater tiller weight, 1,52 on average, in relation to 1,18 provided by the inoculation in the zero dose of N-fertilizer.

Crude protein contractions (CP; g kg^{-1}), neutral detergent fiber (NDF; g kg^{-1}), acid detergent fiber (ADF; g kg^{-1}) and *in vitro* digestibility of the dry matter (IVDDM; g kg^{-1}) are shown in Table 3. There were no interaction effects between the PGPB and the doses of N-fertilizer regarding these parameters.

Table 3. Crude protein (CP; g kg^{-1}), neutral detergent fiber (NDF; g kg^{-1}), acid detergent fiber (ADF; g kg^{-1}) and *in vitro* digestibility of dry matter (IVDDM; g kg^{-1}) of ruzigrass inoculated with plant growth-promoting bacteria and N-fertilizer doses

Parameter	Plant Growth-Promoting Bacteria				SEM
	non-inoculated	Ab-V5	CCTB03	AMG 521	
CP (g kg^{-1})	126,44	128,62	128,9	127,33	3,1
NDF (g kg^{-1})	548,76	548,83	552,27	549,82	16,3
ADF (g kg^{-1})	268,4	271,2	270,2	270,6	2,9
IVDDM (g kg^{-1})	742,3	743,8	742,5	742,5	15,3
Parameter	N-fertilizer Doses (kg of N ha^{-1})				SEM
	0	50	100		
CP (g kg^{-1})	122,39 b	127,22 b	133,85 a		2,60
NDF (g kg^{-1})	554,05 a	548,93 ab	546,79 b		16,30
ADF (g kg^{-1})	271,00	269,60	269,70		2,80
IVDDM (g kg^{-1})	740,70	743,80	743,90		15,30

Azospirillum brasilense Ab-V5; *Pseudomonas fluorescens* CCTB03; *Pantoea ananatis* AMG 521. SEM = standard error of mean. Means followed by different lowercase letters in each line are significantly different ($P < 0.05$ Tukey test).

The inoculation of the PGPB strains had no effects on the results of CP, NDF, ADF and IVDDM, with an average of 127,82, 549,92, 270,10 and 742,78 g kg^{-1}, respectively. However, the doses of N-fertilizer had effects on the aforementioned parameters (Table 3), with a greater concentration of CP and smaller concentration of NDF (p = 0,0001 and 0,0085, respectively) in the dose of 100 kg of N ha^{-1}. ADF and IVDDM were not influenced by N-fertilizer.

Root mass (RM; kg ha^{-1}) and root diameter (RDi; mm) are presented in Table 4. There was no effect of the interaction between the PGPB and the doses of N-fertilizer for these parameters.

Table 4. Root mass (RM; kg ha^{-1}) and root diameter (RDi; mm) of ruzigrass inoculated with plant growth-promoting bacteria and N-fertilizer doses

Parameter	Plant Growth-Promoting Bacteria				SEM
	non-inoculated	Ab-V5	CCTB03	AMG 521	
RM (ton ha^{-1})	11,147	11,77	11,398	11,305	0,476
RDi (mm)	0,20 a	0,19 ab	0,18 ab	0,17 b	0,010

Parameter	N-fertilizer Doses (kg of N ha^{-1})			SEM
	0	50	100	
RM (ton ha^{-1})	10,971	11,144	12,1	0,412
RDi (mm)	0,18	0,18	0,19	0,010

Azospirillum brasilense Ab-V5; *Pseudomonas fluorescens* CCTB03; *Pantoea ananatis* AMG 521. SEM = standard error of mean. Means followed by different lowercase letters in each line are significantly different ($P < 0.05$ Tukey test).

The inoculation of the PGPB strains had no effect on the RM results, with an average of 11.41-ton ha^{-1}. Yet, regarding RDi, the AMG 521 strain was the one that presented the best result with the smallest root diameter (0,17 mm) of ruzigrass. With regard to the use of N-fertilizer, there was no effect on RM and RDi (Table 4), with an average of 11.41-ton ha^{-1} and 0,18 mm, respectively.

The interaction between PGPB and doses of N-fertilizer for root area (RA, p = 0,0230), root length (RL, p = 0,0420) and root density (RDe, p = 0,0117) are presented in Table 5.

Table 5. Effect of interaction between plant-growth promoting bacteria (PGPB) and x N-fertilizer doses in root area (RA, mm².dm³), root length (RL, mm) and root density (RDe, mm.cm³) of ruzigrass

Parameter	non-inoculated	Ab-V5	CCTB03	AMG 521	SEM
	---------- Root Area (mm².dm³)----------				
0 kg of N ha^{-1}	67,34 A	84,18 A	70,27 A	66,83 A	7,280
50 kg of N ha^{-1}	83,52 A	66,07 AB	50,12 B	39,09 B	7,280
100 kg of N ha^{-1}	75,08 A	70,01 A	44,67 A	62,60 A	7,280
	---------- Root Length (mm)----------				
0 kg of N ha^{-1}	343,20 A	362,62 A	361,47 A	365,62 A	24,820
50 kg of N ha^{-1}	358,33 A	352,51 AB	254,63 B	239,10 B	24,820
100 kg of N ha^{-1}	289,69 A	275,12 A	257,91 A	243,02 A	24,820
	---------- Root Density (mm.cm³)----------				
0 kg of N ha^{-1}	0,42 A	0,46 A	0,46 A	0,47 A	0,030
50 kg of N ha^{-1}	0,47 A	0,45 AB	0,32 B	0,30 B	0,030
100 kg of N ha^{-1}	0,36 A	0,34 A	0,33 A	0,31 A	0,030

Azospirillum brasilense Ab-V5; *Pseudomonas fluorescens* CCTB03; *Pantoea ananatis* AMG 521. SEM = standard error of mean. Means followed by different uppercase letters in each line are significantly different ($P < 0.05$ Tukey test).

For RA, RL and RDe, the results showed that the control treatment that received only doses of N-fertilizer without the inoculation of PGPB, and the treatment with the inoculation of the Ab-V5 strain, had similar results, with an average of 75,31 and 73,42 mm².dm³, 330,41 and 330,08 mm, 0,42 and 0,42 mm.cm³, respectively. The CCTB03 and AMG 521 strains demonstrated smaller RA, RL and RDe when associated with the dose of 50 kg of N ha^{-1}.

4. DISCUSSION

Even though the influence of the inoculation of PGPB and doses of N-fertilizer on the production and accumulation of forage mass (Figure 2) was not verified in this study, the literature shows positive results based on the isolated action of PGPB or N-fertilizer, or the association between them.

Results demonstrating an increase in biomass as the use of N-fertilizer in tropical grasses is reduced have been reported in studies conducted by Hungria et al. (2016) in *U. brizantha* cv. Marandu and *U. ruziziensis*, Aguirre et al. (2018) in *Cynodon dactylon* (L.) Pers. cv. Coastcross-1 and Leite et al. (2018) in *U. brizantha* cv. Marandu. However, these results are still inconclusive, since further research is necessary for provide a more solid and replicable database in a way that this technology can be transformed, in fact, into a commercial product to be used in tropical pastures.

The use of PGPB, for instance, demonstrates the capacity to contribute to the growth and development of forage, allowing increments of up to 60 % in forage mass, as reported by Megías et al. (2017) and Leite et al. (2018). Some studies have attributed the increments in terms of forage mass to hormones, such as cytokinins, gibberellins and auxins, synthesized by PGPB (Fukami et al., 2017 and Gouda et al., 2018).

Regarding research on the use of fertilizers in pasture, it is known that all nutrients are necessary and important for the growth and development of pasture. That way, a lack of any nutrient can, at some stages of forage maturity, hinder the expression of its productive potential.

Among the nutrients, nitrogen (N) is considered one of the most required by plants (Dobbelaere e Okon, 2007). Therefore, it is one of the most efficient nutrients when it comes to enabling grasses to have a greater accumulation of mass production and a better nutritive value (Palmer et al, 2014).

Although the use of N-fertilizer increases mass production, it also leads to more costs in pasture management (Guimarães et al., 2011). That is why the use of PGPB is so interesting for the modernization of animal production on pasture, thus, minimizing the external dependency on the use of N due to the compensation by the increment of N in the system through the biological fixation of it. Besides, PGPB improve the availability of other nutrients, such as phosphorus.

In this study, the use of greater doses of N-fertilizer (100 kg of N ha^{-1}) in ruzigrass contributed to a larger amount of tillers in the forage canopy (Table 1), as verified by Lima et al. (2016). We also found out that the inoculation of PGPB associated with doses of N-fertilizer contributed to the emergence of heavier tillers. The production of heavier tillers (Table 2), and in greater amount, allows increments in the production of forage mass and an increase in pasture support capacity, with a positive impact on animal production (Cecato et al., 2011).

The greater concentration of CP and the smaller concentration of NDF, associated with the greater dose of N-fertilizer (kg de N ha^{-1}) was possibly due to the increase in nitrogen compounds in the plant and, as a consequence, a decrease in fibrous compounds, as mentioned by Van Soest (1975), since they are inversely proportional. N composes part of the structure of nucleic acids and proteins and, for that reason, its supply is directly related to the raise in CP (Malavolta, 2006).

The smaller RDi verified with the inoculation of the AMG 521 strain (Table 4) is considered as the best result, due to the fact that thinner root hairs are more efficient, enabling greater exploration of the soil

and better absorption of water and nutrients, as demonstrated in studies by Do Vale et al., (2013), and Verbon and Liberman (2016). In their turn, roots of greater diameter are related to the plant's energetic supply (Ribeiro et al., 2011; Sanches et al., 2017). Greater root volume, besides improving absorptivity and exploring a greater area of the soil, also prevents soil compactation since the most superficial layers to the deepest ones (Cecato et al., 2006).

This change in morphology and more expressive root volume can affect the plant's efficiency in the use of nutrients available in the soil (Sureshbabu et al., 2016; Verbon and Liberman, 2016). This alteration is possibly related to bacterial action, which possibly potentializes the activity of hormones commonly synthesized by the plant, as described by Spaepen (2015) and Mamédio et al. (2020).

PGPB play two roles that have a direct effect in terms of enhancing efficiency in the use of N. One of them is the production of hormones, and the other one is the capacity of biologically fixing nitrogen (Rodolem et al., 2017).

The literature clearly proves that bacteria depend on the availability of a certain amount of N in the system, so that their metabolic activities occur. The absence of N in the soil may inhibit microbial activity, leaving the bacteria dormant (Marschner et al., 2006). Likewise, the excess of N has the same effects on these microorganisms (Zhu et al., 2016).

The use of N-fertilizer has had its efficiency proven in tissues renovation, thus, considerably increasing the production of forage mass. Nevertheless, its indiscriminate use can not only compromise the microbiota, but also be a serious pollution agent against the ecosystem. For that reason, the use of PGPB has been considered a sustainable alternative for reducing the amount of N-fertilizer required by forage, so that it can achieve its productive potential.

For their action, these bacteria have been described as plants growth promoters from the synthesis of substances that contribute to a higher interaction of roots with nutrients cycling (Moreira et. al., 2010).

The absence of effects verified in the association between PGPB and tropical grasses can be attributed to an inadequate combination of them, since not all bacteria are responsive to all grass species (Mamédio et al., 2020).

5. CONCLUSION

Although plant growth promoting bacteria were not efficient in the production and accumulation of forage mass, of both the aerial part and the root area of ruzigrass, they still represent a sustainable alternative, which is viable when it comes to livestock on pasture. It is due to the fact that their use potentializes the action of N-fertilizer in pasture, reducing the amount used and, thus, leading to a decrease in the production costs.

ACKNOWLEDGEMENTS

The research group is supported by INCT—Microorganisms Promoting Plant Growth Aiming at Agricultural Sustainability and Environmental Responsibility (MPCPAgro), CNPq (465133/2014-4, Araucaria Foundation-STI, CAPES). M. Hungria is also a CNPq research fellowship recipient. This study

was supported by the study group in forage (Agrisus Foundation PA1732/16, CNPq 405389/2016-7, CAPES). U. Cecato is also a CNPq research fellowship recipient (CNPq-307838/2014-5).

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest.

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Reflections on The Concept of Ideology

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Abstract

This article presents narratives and arguments around the theme of ideology, based on the human condition of language. Despite having already been investigated by many authors, which hinders any claim to originality, the theme is not capable of a definitive delimitation. The issue of ideology will be addressed in line with the interpretation of notable intellectuals, with an emphasis on the culture irradiated by the media. The script of the article, constituted from a bibliographic review and a critical and reflective approach, gathers digressions on the issue of Lyotard's meta-reports and Baudrillard's hyper-reality.

Keywords: ideology; language; materialism; policy; post-modernity.

Initial thoughts

The following arguments refer to a theme that has made a name for itself in the last century and that continues to spark debates, especially in discourse analyses. Despite having already been investigated by many authors, which hinders any claim to originality, the theme is not capable of being definitively delimited. The discussion will be on the concept of ideology, in line with the interpretation of thinkers such as Lyotard and Baudrillard, with emphasis on the issue of culture irradiated by the media.

Contemporaneity is identified as the postmodern era. It constitutes a complex cultural phenomenon that encompasses a multiplicity of areas, theoretical disciplines and artistic practices. In the latter sense, the postmodern is linked to the contemporary development of new aesthetic and new artistic forms in cinema, literature, architecture, sculpture, etc. Thus, for example, in literature and cinema, the postmodern appears as a loss of the sense of unit, with emphasis on different and diverse realities that coexist without

a meaning unit, as a destination of subjects who no longer understand the world where they live nor understand themselves. In architecture, it involves the critique of modern lines, glass towers and concrete blocks that reduce individuality to uniformity and do not allow the differences and particularities of each site to develop their own forms. In these fields, among others, what we can call contemporary appears as an attempt to mix art and life, reality and fantasy, high culture and culture of masses, codes and styles of different ages and cultures. In general, however, it is a phenomenon that goes beyond the new forms of architectural and artistic expression. As Harvey (2001) pointed out with insight, the contemporary is "[...] a new structure or way of feeling", a special way of being, interpreting and experiencing the world that undermined the feeling of security and self-confidence more typical of the modern age.

Another guiding idea to think about the contemporary is the cognitive position characterized by its distrust in totalizing discourses, reason and truth, especially in relation to the aspects of such discourses still linked to Cartesianism. Distrust also extends to all forms of essentialism and reductionism, typical of a mathematizing rationality. As in post-structuralism, discourse appears as the central instance of social life, but proposes indeterminacy, the primacy of difference and the incommensurability between discourses. Each of which, by means, has its own regime of truth, thus constituting an ascetic position with respect to the autonomy of the subject.

Its intellectual roots are complex, because its antecedents are found in irrationalist, relativistic and ascetic philosophies, especially Nietzsche' philosophies. Moreover, the declination of structuralism, and especially the fragmentation and dissolution of the Althusserian School, as well as its replacement by post-structuralism, are also an important antecedent. The central problem of the contemporary are its doubts about reason, modernity and, especially, enlightenment.

Distinctly from post-structuralism, the contemporary no longer believes in emancipatory struggles such as those that marked the Enlightenment movement, in terms of reason, and Marxism, in terms of economic and political sociability, preferring to embrace the chaotic and unpredictable character of reality. However, under the postmodern label, there is a wide variety of authors who do not necessarily agree on every aspect. There is no consensus on the way of being and thinking of our time or about tradition. We can say that there is a differentiation between two important contemporary orientations: the skeptical and the affirmative. The skeptical, in the case here, Baudrillard, offer a gloomy, negative and pessimistic view of life, identified by the fragmentation, disintegration, malaise, senselessness and chaos of the human world. The affirmative, among which we can mention Vattimo, are also modernity criticizers, but have a more optimistic and hopeful view of contemporaneity. These are open to positive political actions, in addition to allowing themselves to accept that certain value alternatives are better than others.

The contemporary represents a type of reaction against modernity. While the latter highlights linear progress, positive science and reason, the former emphasizes indeterminacy, fragmentation, heterogeneity and difference. Furthermore, it suspects of both absolute truths and totalizing discourses of universal application, especially those that propose human emancipation. According to Boaventura, there is need to distrust the main ideas of modernity, which are:

> Distinction between subject and object and between nature and society or culture; reducing the complexity of the world to simple laws capable of mathematical

> formulation; a conception of reality dominated by deterministic mechanism and truth as a transparent representation of reality; an absolute separation between scientific knowledge - considered the only valid and rigorous - and other forms of knowledge such as common sense or humanistic studies; privilege of functional causality, hostile to the investigation of "ultimate causes", considered metaphysical, and centered on the manipulation and transformation of the reality studied by science (SANTOS, 2010, p. 25).

Since Nietzsche, at least, truth is considered to be built and imposed by power. That is, the claims about truth are forms of terrorism that silence those who disagree. For contemporary thinkers, in general, the world cannot be consistently represented in its entirety, nor does historical development have a universal meaning. By questioning our ability to achieve a truth unrelated to a particular discourse, and by doubting the existence of social relationships and essential contradictions of society, many contemporary thinkers make epistemological judgment implicit in ideological criticism impossible. Despite this, Lyotard and Baudrillard, as well as Foucault, initially very close to the Marxism's positions, having been influenced by Althusser, as can be appreciated in their early works.

They all used a critical concept of ideology, although gradually, they became consciously away from it in their intellectual evolution. Maybe, for this reason, they end up reintroducing a form of ideological criticism through the back door (without recognizing it), so to speak, which subjects them to a contradiction: while they doubt the validity of total discourses and their ideological criticism, they must assume the validity of their own criticism.

1 Lyotard's meta-reports issue

The first stage of Lyotard's intellectual production was deeply marked by Marxism. In one of his first works, the author accuses Husserl of wanting to find a third way between idealism and materialism, and, through this ambiguity, conceal the imperialist crisis of 1914, which, according to Lyotard, is the main cause of the crisis of philosophy.

Lyotard criticizes phenomenology because "[...] its historicity, its intuitionism, its radical intention, its phenomenism, constitute ideological factors that seek to hide the true meaning of the crisis, to avoid reaching inescapable conclusions" (Lyotard, 1973, p. 56). Undoubtedly, here, there is a clearer implicit reference to a critique of ideology as concealment or false awareness of reality. Later, Lyotard repeatedly uses Marx's concept of ideology when discussing philosophy and action. At this moment, he considers philosophy as an ideology, a false position, not because its contents are false, but because it tends to disconnect from the reality it represents.

The conception of ideology, from Marx's perspective, is very close to Freud's position, Lyotard says. It is admitted that there is a truth in ideology that corresponds to a real problem, "[...] which is that of one's time, but its falsehood consists in the answer to this problem, as it informs and presents the problems of the real man, coming out of the real world and does not lead to its resolution" (Lyotard, 1973, p. 55). Later, the author theorizes about the "ideological canvas" (something that hides) and the "historicist-

dialectical ideology". Furthermore, Lyotard, thinking so, begins to distance himself from the concept of ideology. Analyzing the social effects of cinema, he states the following:

> [...] let's highlight how miserable it is to answer this question in terms of the simple superstructural function of an industry, cinema, whose products, films, would act on the consciousness of the public *in order* to blunt (confuse) through ideological infiltrators (Lyotard, 1973, p. 55).

In a second stage, Lyotard produces a critique to Marx and tries to abandon the concept of ideology. The first problem he faces is that, in order not to contradict himself, he must deny that the point is to criticize Marx or read his writings as if they were a theory subject to evaluation. In one of his arguments, Lyotard strives to regard Marx's texts as works of art, drives of desire, libidinal values. Lyotard ponders that "[...] the signs can also be similar as [...] signs of intensity, such as libidinal values (which are not values of use or change), as pulsations of desire", and that money, taken as a commodity, in the same way as the other objects in the capital system, "[...] is not only a value that is converted, but a burden of libidinal intensity [...] the capital system is not the place to hide an intended value that would be prior" (1974, p. 101). For Lyotard, a discursive formation is not much different from a libidinal formation, and from this, it is inferred the need to renounce denounce and console.

Following Wittgenstein, Lyotard maintains in more recent works that society or social bonding is a series of language games, each with its own rules and criteria of truth. Language games or discourses are immeasurable among them, deriving from this the lack of unity and totality of society. What predominates is diversity and conflict. For this reason, the author exclaims: "[...] let's wage war against totality [...] We pay a high enough price for the nostalgia of the whole and the one" (2001, p. 82). Lyotard believes that totalizing social theories are not only extreme simplifications but also "terrorists", because they legitimize the suppression of differences. No game of language or speech can be privileged.

Science plays its own game, is unable to legitimize other language games, but above all is unable to legitimize itself without resorting to a narrative. Paradoxically, modern science has always thought of itself in conflict with narratives. While it produced objective and impartial knowledge, narratives were considered fables and stories that people invent to make sense of their lives, but which do not provide real knowledge. Lyotard believes that this modern conception of pure objective knowledge, unlike narratives, is a myth; in fact, it is another narrative. In other words, science is obliged to legitimize the rules of its own game and, to do so, it produces a philosophical discourse of legitimation or meta-discourse. The author argues that the meta-discourse of modern science draws attention to great reports. Among the influential meta-accounts of the last 200 years, which served to legitimize the myth of objective science, Lyotard mentions the heroic legends of "wealth creation", which underlies classical political economy, the "hardworking subject", who underlies Marxism, and the "dialectic of the spirit", which sustains Hegelianism.

As a consequence, scientificity is in the last term based on a certain class of meta-report. Each meta-report has its own immeasurable logic with others; no meta-report can be objectively proven or refuted; none is inherently better than another. For this reason, people became skeptical about the claims of truth of

all meta-reports. According to Lyotard, the condition of postmodernity is basically characterized by the incredibility of meta-reports: "[...] the great narrative has lost its credibility"; "[...] most people have lost their nostalgia for the lost narrative" (2001, p. 37). Lyotard situates this argument in the context of new communication technologies in advanced capitalist societies. Bell and Touraine's theses on the transition from industrial society to a post-industrial society based on information, for which knowledge has become the main production force, continues here. Hence the status of knowledge has changed. It is no longer an end in itself, nor can it make emancipatory or universal demands. For Lyotard, "[...] knowledge is and will be produced to be sold, is and will be consumed to be valued in a new production" (2001, p. 15). Knowledge is now hopelessly enclosed in the plurality of language games.

This conception has consequences for the subject in his/her cultural productions, because each person lives in the intercession of many language games, that is, located in the nodal points of specific communication circuits so that the social subject even seems to dissolve in this dissemination of language games. It is not surprising, then, that, for Lyotard, there cannot be a subject of history. For the author, any claim of a language game to be more true or superior to others must be resisted. For this reason, the idea of a rational politics must be abandoned. Politics must admit to being the realm of opinions, the realm of multiplicity and diversity. There is no way to decide between opinions if there is no legitimate action to science: "There is never a question of a massive and unique reason - this is nothing but ideology. On the contrary, there are plural rationalities" (Lyotard, 2001, p. 74). The same idea of justice cannot intrude among the various language games.

Therefore, there is a central paradox in Lyotard's thinking regarding the concept of ideology. He qualifies the idea of a single reason, or the supremacy of a single game of language, or the privilege of a meta-report as "ideology", following the tradition that ensues it with Marxism. This conception would consist of distorted ideas, against which he argues effusively, not only distorted ideas but, moreover, apparently no longer reliable for ordinary people. But on the other hand, that same total critical judgment, which seems to accept the concept of ideology, loses its entire base of support by having to rely on a game of language that should criticize another game of language, something unacceptable to Lyotard himself. If we only live in a world of information, which cannot require any privilege, how to criticize other information?

This conception of a critical concept of ideology, which aims to know the social contradictions and how they can be really solved, shares with other meta-reports a totalitarian character. Lyotard does not really trust the iconoclastic attempts of Nietzsche, Freud and Marx[1]. Lyotard and other French thinkers depart from these masters of suspicion, iconoclastic thinkers. But to claim a suspicion in relation to the masters of suspicion loses the entire basis of legitimacy, because this claim can also be imposed as truth.

Lyotard's thinking about language games is based on relativistic premises, in which a new concept of ideology is redesigned with the prospect of being more appropriate for a democratic theory. This concept seeks to replace the Marxist conception of ideology, understood as similar to a veil or a bad representation that hides a pre-linguistic reality previously established and serves as the basis of truth. The main difference between this concept of Lyotard and Marx's is that the former will accept his limitations as a particular language game, while the latter will consider himself privileged. The new concept of post-Marxist ideology

[1] Paul Ricoeur states that these thinkers are "masters of suspicion" (1988, p. 120).

debunks a particular language game that poses as universal. This new concept is understood as a specific language game that tolerates other language games only as long as they remain humble and self-limited, and therefore particular. Ideology should be eliminated because it stifles the plurality of discourses - in other words, it undermines democracy.

It should be noted that Lyotard, before attempting to derive from his theory a critical concept of ideology, possibly tried to detach himself from the term ideology itself in the false sense, while the existence of a single reason. But there is, implicitly, in Lyotard's position, an unconscious reintroduction of the notion of ideology. On the one hand, the critical use of the term ideology on one occasion corresponds to a slip or a bad custom that Lyotard possibly tries to overcome. For him, Marxism is one of those meta-accounts that they believe are right and do not respect the reasons of other discourses. On the other hand, our point is that the unconscious reintroduction of the concept is made by the back door, that is, not publicly recognized and in contradiction with Lyotard's explicit approach. The implicit notion of ideology cannot be theoretically justified by the same theory explicitly repudiating it.

There is a contradiction between the assertion that a concept of post-Marxist ideology can, with a particular language game, criticize and try to exclude another game of language simply because it is universally true, and the assertion that such a concept of ideology can escape to postulate this exclusion as something also exclusively true. The arguments according to which this concept accepts its self-limitations and is tolerant of other language games are not really sustained, because tolerance seems to evaporate before Universalist discourses. Lyotard disagrees with the idea that the only thing that guarantees democracy is the existence of discourses that do not claim to be true or do not claim to have the truth. But that is manifestly absurd. Democracy consists in allowing different positions to argue and propose their claims of truth, not in denying them the possibility of truth from the beginning. Why should real pretensions necessarily be arrogant? Is not it right that somehow, even implicitly, we claim to know?

2 Baudrillard's hyper-reality issue

Marx's concept of ideology receives a criticism, in another perspective, from Baudrillard. He criticizes the ideology of personal fulfillment as a triumphant ilogicity of the impulses that have passed through the sieve of the purification of guilt, which is nothing more than a tremendous effort to materialize the superego. He also criticizes the ideology of consumption and states that in every isolated consumer there is a sustained illusion of the general discourse about consumerism. For the author, the ideology of consumption tries to convince us that we have entered a new societal era, which is no longer the time of production. According to Baudrillard,

> [...] production and consumption are one and the same great logical process in the expanded reproduction of productive forces and their control. This imperative, which belongs to the system, goes inversely within the mentality, ethics and daily ideology, and this is its last cunning: in the form of liberation of needs, individual achievement, pleasure and affluence, etc. (2008, p. 50).

Baudrillard, contradicting Marx, states that society must be conceived as a system in which the signifiers have preeminence over the meanings, because "[...] usage values and requirements are only an effect of the exchange value. The meaning (and referent) is only an effect of the signifier" (2008, p. 70). Baudrillard questions the primacy of the value of use in Marx's theory stating that neither needs nor usage values are autonomous realities, because both are modes of simulation produced by the game itself that is established between meanings and signifiers. This is why:

> there is no reality or other principle of reality more than that directly produced by the system as its ideal reference [...] the value of use and meaning does not constitute another place with respect to the system of the other two: they are only their alibis [...] the value system of use is produced by the exchange value system with its own ideology (Baudrillard, 2008, p. 71).

Baudrillard claims that Marx was able to unmask the fetishism of the exchange value, but failed to realize that there was an even deeper mystery in the fetishism of the value of use. A consequence of this discussion about the secondary importance of use values and the primacy of signifiers (exchange values) is the displacement of the ideological phenomenon. Baudrillard understands that, for Marx, ideology can be understood as a relationship of infrastructure and superstructure, between a material production (system of production relations) and a production of signs (culture) that expresses and masks the contradictions in the 'basis'. According to the French thinker, the weakness of Marx's theory of ideology is that it cannot understand the function it plays in culture and signs, except at the level of its own meanings. This is the result of the artificial separation between the economic and the ideological, without realizing that ideology crosses both forms of production, whether of signs or of materials. Thus, Baudrillard understands that Marxist criticism of ideology has as its content a magical conception of its object.

Baudrillard argues against traditional dichotomies that are supposed to be at the center of Marxist theory: subject-object; infrastructure-superstructure; exploitation-disposal:

> Ideology is thus properly situated anywhere in this division. And it is only and uniquely the form that crosses all fields of social production. Ideology takes all production, material or symbolic, in the same process of abstraction, reduction, general equivalence and exploitation (1995, p. 78).

For this reason, Baudrillard agrees with Roland Barthes on the subject of the denotation-connotation distinction. Barthes, in fact, abandons the exclusive distinction between these two terms that he had previously proposed and argues that "[...] denotation is not the first of meanings, but it is intended to be; under this illusion, it is in the last term nothing more than the last of the connotations" (1973, p. 9). Baudrillard takes advantage of this distinction in his theory of ideology. He states about the connotative that, in short, "[...] denotation is never really anything more than the most attractive and subtle of connotations" (1995, p. 89). The denotation seems objective and innocent, but, in fact, "[...] far from being

the objective term to which the connotation is opposed as an ideological term, denotation is thus (since it naturalizes the process of even ideology) the most ideological term" (*idem*, p. 90).

Later, Baudrillard distanced himself, in his research, from both Marxism and the concept of ideology. This distancing is due to the fact of understanding Marxism as a reflection of productivist capitalism, constituting itself as a small-bourgeois and conservative critique of political economy, which removes its revolutionary character. The main argument is, in fact, that Marxism depends on the same basis as political economics. Baudrillard declares that the era of object production has ended and has been replaced by a new era of sign production. For this reason, all fundamental concepts of Marx's analysis (production, mode of production, productive forces, etc.) must be radically questioned and, to a large extent, can no longer be contextualized in the present.

Baudrillard develops a new theory of simulations, for which codes, spectacles, models, images and play between signs constitute the organizing principles of contemporary society within advanced capitalist societies. One of the main characteristics of these codes and signs is that they no longer refer to something "real", but to something other than themselves. Therefore, the new mode is characterized by hyper-reality and simulation, from the perspective that, from that moment, the signs will exchange with each other without interacting with the real. The other main feature of the domination of the code is the end of the determination: "Determination is dead, indeterminism reigns [...] Everything is unspeakable" (Baudrillard, 1995, p. 120).

Baudrillard believes that there is no longer such a thing as ideology in the way of Marxism, but that there are only simulators. Thinking like this, the notion of ideology is equivalent to the conception of a sign that disguises something. The current times, a moment of simulation of the signs, only conceal what is not behind them, since "[...] the image is unrelated to any reality: it is its own simulation" (1991, p. 170). Just as modernity was the time of the destruction of appearances, and hence the importance of ideology, contemporaneity is the time of destruction of meaning, so there is nothing hidden or able to be revealed. In postmodern society, everything is visible, transparent and changing.

From these convictions, it is understood that Baudrillard does not agree with the idea of a possible political action capable of changing a given reality to something better. For him, this is an illusion, because his understanding of politics has a cynical tone, especially with the left-wing perspectives. Following different, albeit convergent, paths, Lyotard and Baudrillard abandon both Marxism and a general theory of history, more specifically the concept of ideology as a tool of analysis appropriate to the contemporary era. For Lyotard, the central problem of all ideological criticism is the incommensurability of discourses and the absence of an absolute discursive reference that allows the evaluation of other discourses. For Baudrillard, the problem is more complex and lies in the absence of a reality that can be falsified by representations. Everything is by signs, simulation and hyper-reality and can be seen without problems.

Final thoughts

Lyotard uses the term ideology in a critical sense, still in his earliest writings, without realizing the paradox. The thinker does not realize that one can only affirm the ideological character of something based on a totalizing meta-report, and that his concern to preserve the purity and uniqueness of each game of

language makes him stumble on the tip of the iceberg he tried to avoid: the affirmation of the primacy of a certain game. What Lyotard proposes, without recognizing it, is the unmasking of unmasking, the criticism of criticism. It should be noted, however, Lyotard's inconsistency in promoting plurality and heterogeneity "[...] of language games, and soon after excluding from his reign of speech those great narratives that suggest that they illegally monopolized the discussion and present illegitimate claims in favor of his privilege" (2011, p. 172).

Baudrillard also cannot avoid reintroducing criticism of ideology through a back door, through a false door. Upon proposing the interpretation of certain phenomena, he implicitly postulates that seemingly obvious realities are not real, or that certain particular realities that he analyzes conceal an excess of that same reality, hyper-reality. Implicit in such statements there is a contradiction.

According to Baudrillard, Disneyland presents itself as an imaginary childish world to hide the fact that the rest of North America is childish:

> Disneyland is here, to hide the fact that it is the "real" country, the whole "real" America, Disneyland (as well as the prisons that are here to hide the fact that it is the social in its entirety, in its banal omnipresence, which is the jailer). Disneyland presents itself as imaginary in this order to make us believe that the rest is real, when in fact all of Los Angeles and the America around it are not real, but of the order of the hyper-real and the simulation. It is no longer a question of the false representation of reality (ideology), but of hiding the fact that the real is no longer real, but rather saving the principle of reality (1991, p. 172).

Another example analyzed by Baudrillard is Watergate. It was presented by the media as the denunciation of a scandal aimed at reviving public morality. In the facts, Baudrillard argues, Watergate's depiction as a scandal, firstly, hides the fact that "there is no difference between the facts and their denunciation", since identical methods were employed by the CIA and Washington Post journalists, and, secondly, the fact that Watergate was not a scandal. Again, Baudrillard argues that if we had resorted to a concept of ideology, its role would have been to conceal the scandal, while in reality the media concealed the fact that there was no scandal, no principle at stake, no difference between those in the government and those who denounced the scandal.

For Baudrillard, the boundary between representation and reality implodes, and society is now governed by symbols and codes. To a large extent, we live in a "hyper-reality" of simulation, in which images, spectacles and the game of signs replace the logic of production and class conflict. Reality, as Marx knew it, no longer exists, or was subordinated to the new reality of sign produced by the media.

All these statements: "New York is already the end of the world"; "The social is prison"; "The real country is Disneyland"; "Watergate is not a scandal"; "The third world war has already happened", are the new realities that the ideology conceals, the realities that pass through its representations. Upon stating: the conference in New York, the prisons, Disneyland, Watergate, these events are presented as real, but in reality are hyper-real, in the sense that their reality goes beyond themselves. While, for Marx, the appearances fixed in ideology were the opposite of hidden internal relations, for Baudrillard, the elements

present in the events he analyzes reflect in miniature a broader reality that is hidden in the process. What is hidden is not the opposite but the excess of this same reality, hyper-reality.

For Baudrillard, on the contrary, the typical of postmodernity is the fact that the meaning itself was destroyed: "[...] in postmodern society [...] everything is visible, explicit, transparent, obscene." The same logic is followed by the author in his criticism of other theories. When Baudrillard inadvertently invites us to "[...] unmask everything that is hidden behind the concepts of production, mode of production, productive forces, etc." (Baudrillard, 1995), is not he implicitly alluding to a masked reality that he discovers through ideological criticism?

Instead of being ubiquitous, power was hyper-realized in simulation. Hyper-reality is finally the dissolution of reality. For this, Baudrillard states that "[...] the secret of great politicians was to know that power does not exist. That it is nothing but a perspective-space of simulation [...] and that if power seduces, it is because it is a simulation". The same type of argument is repeated with respect to sexuality: "[...] what Foucault spoke to us so well about sexuality [...] just why was this figure of sexuality like that of power, in the process of disappearing"?

In his left-winged criticism, Baudrillard uses a concept of ideology of a more Machiavellian-Nietzschean character. The left, he says, believes in solidarity, the common good, honesty, public virtue, etc., it does not see that these are just masks, because politics consists of private vices, low instincts and distortions.

Paradoxically, therefore, the aggressive position of the contemporary in relation to the concept of ideology fails to try to completely eradicate - on the contrary, implicitly postulates - the totalizing perspective that he tried to abolish and, therefore, ends up contradicting himself. He repels the criticism of ideology, but introduces several ideological criticisms in his attack on meta-reports and in his analysis of various social phenomena that seem to hide a deeper reality.

As Harvey pointed out, "[...] obsessed with deconstructing and delegitimizing each form of argument", one doubts their own legitimacy to the point where there remains no solid basis for rational action. Postmodernist conceptions want to abandon modernity, but do not want to account for their own positions; thus, they suffocated in such a way the differences between illustration and manipulation, truth and ideology, reason and domination, that they themselves cannot survive their own criticism. Thus, they constitute insensitive and unilateral theories, unable to see the positive aspects of modernity, unable to understand how those positive aspects are articulated and how they exist in opposition to the alienating and repressive traits that have in common with absolutism.

Ultimately, contemporary conceptions could be accused of being ideological for helping to mask the real contradictions of the global capitalist system and trying to divert people's attention to the rarified world of simulations and hyper-reality. They could also be accused of ideological in the sense that, by unilaterally highlighting pluralism and difference, they try to hide the common elements of humanity between different cultures and races. By openly attacking the concept of ideology and, at the same time, using it secretly to criticize the theories (meta-reports) that propose critical concepts of ideology, postmodernism not only contradicts itself, but becomes a convenient ideology of the *status quo*. Relativism and trust in a contemporary rationality hamper people's belief in a better future or in the possible resolution of larger social problems. The consciously sought-after change and politics in general, at least in the most

extreme postmodernist versions, seem to lose all meaning. In other words, reality and the whole agency have been dissolved. In times of accelerated technological change and political and economic crises throughout the capitalist world, no ideological form seems to be more appropriate than postmodernism to defend the system as a whole, because it makes chaos, disconcerting change and endless fragmentation of the normal state of society.

The new, hyper-real world, in which postmodernism is inspired, is the result of liberal market forces. In this scenario, according to Baudrillard, contemporary neoliberalism seems to stem from philosophical premises distinct from those that characterized liberalism in its origin. The second is Universalist: believes in reason and nourishes itself with the illustrated idea of progress. The first, in turn, attacks reason, does not believe in progress and highlights the particularity and locality. Nevertheless, what is usually not recognized is that by proposing the free play of market forces as the cornerstone of its theory, neoliberalism maintains and supports both the individual rationality of the private producer and the overall irrationality of the system or total result.

Finally, in terms of indications, we argue that the review of Lyotard and Baudrillard's positions on ideology and its resonances in contemporaneity is an interesting path for other authors with different perspectives on the same theme in later texts. And, above all, it indicates possibilities to understand cinema and its current settings. Perhaps there is no way to dispense with a thought that takes reality into account, however completely configured in the sygnic dimension, as Baudrillard argues. Is not his conception of hyper-reality another interpretation, among others, of contemporaneity?

We know that there are theoretical paths in which language games can be approached not as the basis for the construction of an absolute and authoritarian truth about others. These language games, in other scientific and philosophical domains, can be treated under the dominance of a discursive formation, as Foucault and later Michel Pêcheux, who is self-places as dominant, heterogeneous, with room for the different, but amalgamating language, subject, history and ideology. Thus, truths are formed by the convergence of several discourses under the dominance of a discursive formation. The ideology that governs formation is not equivalent to a veil that conceals pre-linguistic reality, but to a constitutive element of the meaning of language.

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Denial in Bereavement: Psychological Well-Being of Parentally Bereaved Students in Kenya

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ABSTRACT

Bereavement is one of the most stressful events in a young adults' life. The purpose of this study was to determine the extent to which denial affects psychological wellbeing of bereaved students. The study was conducted in day public secondary schools in Gatanga Sub-county, Murang'a County, Kenya. A sample size of 50 bereaved students was used. The findings indicated that there was no significant effect of denial of parental loss on psychological wellbeing at the p<.05 [F (1, 48) = 0.041, p = 0.841]. This demonstrates that the lower the denial of parental loss, the lower the psychological wellbeing can be attributed to other factors outside denial of parental loss. Implications of this finding are discussed.

Keywords: Bereavement, denial, bereaved students, psychological wellbeing, Gatanga Sub-County

1. Introduction

When experiencing denial, life becomes meaningless and an overwhelming sense of loss of direction sets in and people numb themselves to try and cope with the situation each day (Worden, 2010). In denial, people only let in as much as they can handle to avoid becoming overwhelmed by the sense of the loss. Students behave in the same way as a coping mechanism with a phenomenon that they have never experienced before.

School life in the UK observed denial as a recurrent theme among the students, Cupit *et al* (2016). It was noted that students used denial to 'postpone' the need to feel the pain and inadequacy associated with loss. Likewise, in other western nations students are observed to make statements such as 'This isn't happening' to the counsellors when discussing the loss of a parent (Carr, 2015). Another study in India on female adolescent is reaction to bereavement show that they use denial as a mechanism to buffer the immediate shock of the loss (Rastogi, & Singh, 2015). Denial is the first stage that individuals experience and although temporary, it helps the student through the first wave of pain. Some students could also isolate themselves and start seeing life as meaningless and that nothing is of value anymore (Li, Chi, Sherr, Cluver, & Stanton, 2015).

Another study in South Africa based on the effects of bereavement on the psychological well-being of students found that girls exhibit indifference to help them to forget about their suffering (Thurman, Luckett, Nice, Spyrelis & Taylor, 2017). Students try to find way through which to go about every day activities despite the loss through denial, which makes them, cope and survive the day, as observed among Ghanaian students (Yendork & Somhlaba, 2014). Among Zambian students, researchers found that students even try

to strike a deal with a higher power to reverse the death of their parent(s) and they will in turn do something back like becoming more disciplined or work harder in school (Mellins, & Malee, 2013).

Similarly, in neighboring Uganda, Kinyanda, Kizza, Abbo, Ndyanabangi and Levin, (2013) sought to investigate the prevalence and risk factors of depression in childhood and adolescence as seen in a community sample derived from four disadvantaged districts in north-eastern Uganda. They found that denial was used as a coping mechanism by adolescents to avoid bearing the brunt of the effects of losing a parent or close relative. Owaa, Raburu and Aloka, (2015) mention that denial is a common strategy used among orphaned students to help them cope with the pressure of losing one or both of their parents.

Students in denial will often behave as if nothing is wrong despite the fact that they have just lost a parent. They interact with their peers in a somewhat normal way and carry on with their lives despite obvious signs that they are hurting. Some might even seem more energetic than usual turning to class early, joining clubs or making a host of new friends they were not interacting with. Normally quiet students might turn loud or become class jokers and clowns (Cousins, Servaty-Seib & Lockman, 2017). On the extreme, students might turn to alcohol or other drugs to numb the pain and shock of loss (Puffer, Drabkin, Stashko, Broverman, Ogwang-Odhiambo, & Sikkema, 2012). These behaviors help the student to carry on for a while but it all comes down and the façade is broken giving way to anger and sadness (Owaa, Raburu & Aloka, 2015). Helping the student to come to terms with the loss can help accelerate the healing process. Intervention strategies that help the students to come into terms with the passing on of their parent should be undertaken to help them move on with life.

2. Methods and Procedures

The study employed descriptive research design on the variables and explained them in details resulting to a comprehensive study on the phenomenon in the area of study. The dependent variable for this study was psychological wellbeing that is manifested in three levels; levels of anxiety, levels of attentiveness, and self-awareness. The independent variable was denial in bereavement. Information on denial in bereavement and psychological wellbeing was collected using questionnaires. The study was conducted in day public secondary schools in Gatanga Sub-county in Murang'a County, Kenya. The Sub County is located in the southern eastern part of Murang'a County. Gatanga has an increased record of demise of adults, some of whom are parents of students in day public secondary schools.

2. Results

The objective of the study was to determine the extent to which denial affects psychological well-being of parentally bereaved students. The results are presented in Table 1.

Table 1: Denial and Psychological Wellbeing

			psychological wellbeing		Total
			Low	High	
Denial of parental loss	Low denial	Count	30	12	42
		% within Denial of parental loss	71.4%	28.6%	100.0%
	High denial	Count	6	2	8
		% within Denial of parental loss	75.0%	25.0%	100.0%
Total		Count	36	14	50
		% within Denial of parental loss	72.0%	28.0%	100.0%

Source: Field Data (2019)

Table 1 indicates that 30(71.4%) of participants who had low denial of parental loss had low psychological wellbeing while 12(26.8%) had high psychological wellbeing. Among participants with high denial of parental loss, 6(75%) had low psychological wellbeing while 2(25%) had high psychological wellbeing. Majority of the bereaved students have low denial of parental loss. Also majority of the bereaved students have low psychological wellbeing. This concludes that the lower the denial of parental loss, the lower the psychological wellbeing.

These findings implied that denial as a result of parental loss affected the psychosocial wellbeing of students in the study area. The study established that denial of emotions significantly dominate the daily experiences of majority of parentally bereaved students as they come to term with the reality of the loss. According to a study by Yendork and Somhlaba, (2014) students try to find way through which to go about every day activities despite the loss of their parent/s through denial, which makes them, cope and survive the day. They found that denial is used as a coping mechanism by adolescents to avoid bearing the brunt of the effects of losing a parent or close relative. Based on the findings there is a significant relationship between denial and psychological wellbeing of parentally bereaved students based on denial of emotions, resistance to change and conscious avoidance.

To determine whether the descriptive results of the relationship between denial of parental bereavement and psychological wellbeing was statistically significant, a one-way between subjects ANOVA was conducted to compare the effect of denial on psychological wellbeing on whether the lower the denial of parental loss, the lower the psychological wellbeing. The hypothesis posed was: There is no statistically significant relationship between denial of parental bereavement and psychological wellbeing of students. Results are presented in Table 2.

Table 2: ANOVA of Denial of Loss and Psychological Wellbeing

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.009	1	.009	.041	.841
Within Groups	10.071	48	.210		
Total	10.080	49			

Table 2 shows that there was no significant effect of denial of parental loss on psychological wellbeing at the $p<.05$ [$F(1, 48) = 0.041$, $p = 0.841$]. Therefore, the null hypothesis is not rejected. This demonstrates that the finding that the lower the denial of parental loss, the lower the psychological wellbeing can be attributed to other factors outside denial of parental loss. Owaa, Raburu and Aloka,(2015) mentioned that denial is a common strategy used among orphaned students to help them cope with pressure of losing one or both parents. This implies that there are other factors that influences bereaved students' psychological wellbeing other than denial. This includes sudden behavior changes, like turning to alcohol and drugs, to numb the pain and shock.

Moreover, refusing to face the reality, denial, can prevent students from seeking help and opening up about their struggles. Worden (2018) indicates that a bereaved individual cannot initiate the process of healing before they seek to dissociate from their preferred reality and face up to the situation that has befallen them. Without facing the reality, an individual cannot expedite the feelings of sadness, guilt, anger, loneliness, emancipation, and yearning, which accompany the grieving process (Worden, 2018). To start healing, an individual need to start living in the actual reality and for some, this could involve the help of another person. For a student, this could be a relative, another adult, a teacher or the school counselor. However, prolonged denial prevents a student from seeking the much-needed help so that they can start healing.

Furthermore, Jia et al., (2015) established that avoidant coping prevents students from experiencing post traumatic growth. Avoidant coping, the change in behavior to avoid thinking or facing uncomfortable situations can exacerbate anxiety, increase stress and lead to frustration (Rodríguez-Naranjo & Caño, 2016). Post traumatic growth is a preferred outcome for individuals who have encountered traumatic events such as bereavement as it predicts increased resilience, all roundedness and an increased awareness and appreciation of the one's environment. These are signs of a mentally sound individual, and which denial prevents a parentally bereaved student from experiencing.

Denial is also associated with unhealthy behaviour such as impulsive risk taking, substance abuse and delinquency. Glassner (2015) and Cohen, Mannarino and Deblinger (2016) found a link between delinquency, substance abuse and risky behaviour among adolescents in denial of a traumatic event. These outcomes are as a result of the adolescent seeking for ways to distance themselves with the loss and to avoid being overwhelmed by the pain of the loss. Unfortunately, these behaviours can spiral out of control and cause more misery and pain such as frayed relationships with relatives, schoolmates and teachers, as well as feelings of self-loathing and frustration (Chukwu *et al*, 2017). Delinquency and substance abuse can lead to punishment and sometimes even expulsion from the school. Substance abuse and risky behaviour can also lead to girls getting pregnant and young me becoming fathers or even turning to crime and falling with the wrong crowd. Hamdan *et al* (2013) concluded that parentally bereaved youth exhibit greater functional impairment, depression, post and traumatic loss than their peers due to alcohol and

substance abuse. This hinders them from conducting normal activities with a similar ease as their peers which compounds on their poor mental health outcomes. Denial, therefore, leads to behaviour that affects the psychological wellbeing of students such as delinquency and alcohol and substance abuse which doesn't bode well for the grieving process.

Finally, denial is accompanied by fear which affects the daily routines of bereaved students. Fritscher (2020) defines fear as a natural but powerful human emotion in response to real or imagined threat. Prolonged fear is risky to the psychological wellbeing of an individual. According to Fritscher (2020), it can weaken the immune system, lead to memory impairment, interrupt brain processing and reactivity and can also lead to mental health issues such as post-traumatic stress disorder, chronic fatigue and depression. Post-traumatic stress disorder can lead to significant impairment in the life of a student. According to Hetzel-Riggin and Roby (2013), the long-term effects include anxiety, social isolation and withdrawal from the society, poor relationships with others, autoimmune diseases and even depression. Depression on the other hand impairs decision making, leads to a weakened immune system, causes insomnia and causes feelings of sadness and emptiness (Hetzel-Riggin & Roby, 2013). Together, these issues affect how a student carries on with daily life and impairs proper functioning and relationships with others. Fear is a precursor of denial and is accompanied by a wide range of mental health issues and could thus explain the low psychological wellbeing among students in denial.

5. Implications

Institutions like secondary schools should ensure that it establishes an active counseling desk to ensure that psychological well-being of the students is safeguarded through effective counseling.

Teachers should pay attention on bereaved students and observe psychological challenges they experience and collaborate with the school counselors to help them cope with denial in order to support and uplift parentally bereaved students' psychological wellbeing.

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Acceptance of Loss on Psychological Well-Being: Therapeutic Implications on Counselling Parentally Bereaved Students, Kenya

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ABSTRACT

When students lose either one or both parents, they become exposed to behavioral and emotional changes which affect their lives while at at home and at school. The purpose of this study was to determine the influence of acceptance of loss on the psychological wellbeing of bereaved students. The study was conducted in day public secondary schools in Gatanga Sub-county, Murang'a County, Kenya. A sample size of 50 bereaved students was used. The findings indicated that there was no significant effect of acceptance of parental loss on psychological wellbeing at the p<.05 [F(1, 48) = 0.933, p = 0.339]. This demonstrates that the less the acceptance of parental loss, the lower the psychological wellbeing can be attributed to other factors outside acceptance of parental loss. Implications of this finding are discussed.

Keywords: Bereavement, acceptance of loss, bereaved students, psychological wellbeing, Gatanga Sub-County

1. Introduction

Acceptance is not the case of being alright but rather, accepting the reality of the loss and that our loved one is not coming back (Kubler-Ross and Kessler, 2014). This new reality is not acceptable but it is the truth and thus one has to learn to live with it. The individual now must learn to live in a world where their loved one is missing. Students who get to this point readjust their expectations and move on with life finding joy and happiness slowly along the way.

Akerman and Statham, (2014), investigating bereavement in students and its impact on education and psychological outcomes and the effectiveness of support services in the UK observed that after parental loss, assisting the students to come into terms with the loss largely improved their educational and psychological outcomes. They established that once students could be able to accept that their parents have passed on they could carry on with activities that previously might have seemed impossible, starting slowly at first. At adolescence, a person can differentiate reality and fantasy and the sooner they can do this the easier it gets for them to feel well again. Kristensen, Weisæth and Heir, (2012) comment that mitigation strategies that help students to realize that they are not betraying the memory of their loved ones by resuming their normal activities and improve their overall activities sooner than those who do not. Therefore, students in acceptance of loss could be observed to resume their daily chores at home and engage in school activities appropriately. Rastogi, and Singh, (2015) also claim that female students who embrace

art forms to celebrate their loved ones as opposed to lamenting them quickly get to a point where they find meaning and purpose in life.

Studying the coping mechanisms among Nigerian students, Domingo *et al* (2016), concludes that most important of all, acceptance is the one mechanism that brings to an end to all the suffering associated with parental loss. Among the various mechanisms that Nigerian students applied to cope with loss, acceptance of loss was the only thing that brought about total peace. Another study among Nigerian nationals demonstrated that accepting one's condition among the Nigerian youth helped them to move on with the death of a parent Ogbuagu (2012). Therefore, students who go through acceptance of loss tend to embrace life without their parents better. Rwandese adolescents who managed to cope with the loss of their parents did so after accepting that they shall never see their loved ones again (Schaal, Dusingizemungu, Jacob, Neuner, & Elbert, 2012). The awareness of the finality of death of their parents helps them to accept the loss and move on in life. Understanding that life has forever been changed helps adolescents in Senegal to reorganize their lives and take charge of things that have seemingly gone out of hand. They can start studying as they used to and perform chores that they previously had neglected like personal hygiene. Mellins, and Malee, (2013), comment that when Zambian students realize that death is a natural process, they stop blaming the gods for punishing them.

The loss of a parent is painful and tragic experience and coming into terms might not be easy. However, putting in place mechanisms that can drive the student to grieve in a healthy manner so that they can reach the acceptance stage faster can help the student to resume normal activities Muchai, Ngari, and Mumiukha (2014). Grief Counsellors should aim at assisting bereaved students to come into an acceptance with the new lifestyles so that they can start planning for life without their parents Owaa, Aloka &Raburu (2015). When the individual learns that life moves on despite the loss of their loved one, they can build healthy relationships both spiritually and emotionally (Kamau, Kuria, Mathai, Atwoli, & Kangethe, 2012). Religion can also be used both at home and at school to help the grieving students come to terms with the loss in a healthy manner (Puffer, Watt, Sikkema, Ogwang-Odhiambo, & Broverman, 2012). By participating in religious activities, students feel like the void left by the departure of a parent is being filled with a new purpose.

2. Methods and Procedures

The study employed descriptive research design on the variables and explained them in details resulting to a comprehensive study on the phenomenon in the area of study. The dependent variable for this study was psychological wellbeing that is manifested in three levels; levels of anxiety, levels of attentiveness, and self-awareness. The independent variable was acceptance of loss in bereavement. Information on acceptance of loss in bereavement and psychological wellbeing was collected using questionnaires. The study was conducted in day public secondary schools in Gatanga Sub-county in Murang'a County, Kenya. The Sub-county has a significantly high cases of adult deaths in Muranga County.

2. Results

The objective of the study was to determine the influence of acceptance of loss on psychological well-being of parentally bereaved students in day public secondary schools in Gatanga Sub-County, Murang`a County, Kenya. Results are presented in Table 1.

Table 1: Acceptance and Psychological Wellbeing

			psychological wellbeing		Total
			Low	High	
Acceptance of parental loss	Little acceptance	Count	8	5	13
		% within Acceptance of parental loss	61.5%	38.5%	100.0%
	More acceptance	Count	28	9	37
		% within Acceptance of parental loss	75.7%	24.3%	100.0%
Total		Count	36	14	50
		% within Acceptance of parental loss	72.0%	28.0%	100.0%

Table 1 indicates that 8(61.5%) of participants who had little acceptance of parental loss had low psychological wellbeing while 5(38.5%) had high psychological wellbeing. Further, it was established that among students with more acceptance of parental loss, 23(75.7%) had low psychological wellbeing while 9(24.3%) had high psychological wellbeing. Majority of the bereaved secondary school students have more acceptance of parental loss. Also, majority of the bereaved students have low psychological wellbeing. The study concludes that the more the acceptance of parental loss, the lower the psychological wellbeing. These findings implied that acceptance as a result of parental loss affected the psychosocial wellbeing of students in the study area. The study established that acceptance of emotions significantly dominate the daily experiences of majority of parentally bereaved students as they come to term with the reality of the loss.

To determine whether the descriptive results of the relationship between acceptance of parental bereavement and psychological wellbeing was statistically significant, a one-way between subjects ANOVA was conducted to compare the effect of acceptance of loss on psychological wellbeing on whether the littler the acceptance of parental loss, the lower the psychological wellbeing. The hypothesis posed was: There is no statistically significant relationship between acceptance of loss of a parent and psychological wellbeing of students in day public secondary schools in Gatanga Sub County, Murang'a County. Results are presented in Table 2.

Table 1: ANOVA of Acceptance of Loss and Psychological Wellbeing

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	.192	1	.192	.933	.339
Within Groups	9.888	48	.206		
Total	10.080	49			

Table 22 shows that there was no significant effect of acceptance of parental loss on psychological wellbeing at the $p<.05$ [$F(1, 48) = 0.933$, $p = 0.339$]. Therefore, the null hypothesis is not rejected. This demonstrates that the finding that the less the acceptance of parental loss, the lower the psychological wellbeing can be attributed to other factors outside acceptance of parental loss.

These study outcomes therefore implied that bereaved students in Gatanga Sub-County experienced numerous psychological challenges as a result of parental loss and or deaths. According to Kubler-Ross and Kessler (2014) acceptance is not the case of being alright but rather, accepting the reality of the loss and that our loved one is not coming back. This new reality is not acceptable but it is the truth and thus one has to learn to live with it. The individual now must learn to live in a world where their loved one is missing. Students who get to this point readjust their expectations and move on with life finding joy and happiness slowly along the way. Based on an investigating by Akerman and Statham, (2014), assisting the students to come into terms with the loss largely improve their educational and psychological outcomes. They established that once students could be able to accept that their parents have passed on they could carry on with activities that previously might have seemed impossible, starting slowly at first.

Acceptance of loss also helps the students to attain a sense of purpose in life. A sense of purpose is reflected in one's conviction that life holds a meaning and is worth living. Kubler-Ross and Kessler (2014) reiterate that acceptance is not the sense that its okay that one's loved one has passed but rather, despite the loss, one is still going to be okay. It is during this stage that one's emotions start to stabilize and re-enters reality. Individuals begin to adjust and readjust to normal life, but with a keener sense of awareness courtesy of the experience they have gone through. Life holds new meaning and some people are even observed to transform for the better in what Michael and Cooper (2013) refer to as post traumatic growth. Gaining a sense of purpose in life is an indicator of high psychological wellbeing, and which is enhanced by the acceptance of a student's parental loss.

Acceptance can also lead to increased confidence and self-acceptance. An individual with high self-acceptance has a positive attitude about themselves. Self-acceptance is reflected in an individual's ability to accept themselves despite their limitations and in the case of a grieving individual, to accept themselves despite the loss and stop blaming themselves, others or the deceased. After losing a loved one, it is easy to forget about nurturing and taking care of oneself which can further worsen a person's wellbeing. However, self-acceptance enables one to start taking care of themselves by participating in activities that look out for their happiness. This includes emotional, spiritual and physical nurture activities. Students who have accepted the loss of a parent could start seeking help or talking about the loss (emotional), start seeking God and religious practice (spiritual) as well as participating in games at school (physical). Collectively these activities improve their wellbeing and eventually, they can heal and resume normal lives.

Finally, acceptance can lead to environmental mastery, a core aspect of high psychological wellbeing. Autonomy means the ability to govern oneself and thus connotes the ability for self-regulation. According to Benita, Roth and Deci (2014), autonomy in psychology refers to the extent by which a person's behavior is self-determined instead of being coerced or compelled. It is a strong indicator of an individual with high psychological wellbeing. A person with a high score in this aspect can regulate their behavior independent of social pressure or outside motivation. This means that a student who has autonomy does not rely on teachers, adults or peers to tell them what to do. Moreover, they independently choose to participate in school activities such as learning and co-curricular activities. They thus do not get in trouble for failure to carry out what is expected of them at school or at home. Moreover, they are confident of their choices and opinions and are strong decision makers (Benita, Roth and Deci, 2014). Palmer, Saviet and Tourish (2016) discusses how grieving students are more dependent and are unable to manage their own life and affairs. Such students rely on the instruction of adults in their lives which can sometimes even result to being forced to go about conducting their affairs. Loss of autonomy during grief can impair a student's ability to handle their studies or even gather the motivation to stay focused in school. Acceptance, however, gives an individual direction and enables them to consciously make decisions that impact their lives. Kubler-Ross and Kessler (2014) indicate that a fog is lifted during the acceptance stage and an individual grows and evolves. This motivates them to make new plans to move on which include improving relationships and focusing more on what is happening around them. Acceptance, hence, leads to increased autonomy which has positive outcomes for the psychological wellbeing of students.

5. Implications

There is need for teachers to reach out to students who may be experiencing problems related to their emotional life and guide them towards acceptance of loss. Religious organizations and the community at large should take a step to provide for children who have lost their parents in the society to give them a chance to focus on building their lives. Organizations which are concerned with child welfare should be in the forefront in visiting schools in an effort to provide for the students who are bereaved.

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Native Languages in Post Independent Algeria: The Case of Berber

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Abstract

The present paper purports to shed light on the sociolinguistic picture of Berber in Algeria through providing both a descriptive and critical analysis as far as language diversity and mother tongues are concerned. An attempt has been also made to echo the case of Berber as a native language and its potential at the ethno- cultural level. With the aim of evaluating the situation of Berber, we promptly address the following questions: (i) Can diversity be regarded as a cultural richness? (ii) To what extent can Berber be able to generate positive attitudes towards learning it? (iii) What are the implications of its corpus planning?

Keywords: Berber, mother tongues, language diversity, attitudes, corpus planning.

1. Introduction

It is widely acknowledged that Algeria is a pluralist country through the existence of three languages mainly: Arabic, Berber and French. Among the native languages, is, merely Berber (henceforth Tamazight) which belongs to the Hamito-Semitic language tree; basically descended from the Afro-asiatic group of languages alongside Arabic. Berber embodies the largest areas of the Maghreb region stretching along Morocco, Algeria, Libya, Tunisia, Egypt, Mali and even Burkina Faso. It is worth noting that, Berber subsumes a plethora of spoken varieties. These are observed clearly in Kabyle province, Aurès in the east in addition to Mzab and Touareg dialects. As a matter of fact, studies on mother tongues in Africa have given wider currency to Tamazight. According to (Montagnon, 1998, p.21) Berber is regarded as one of the ancient languages in the Maghreb area. Yet, its standing can be even traced back to the period of the Islamic spread throughout North Africa.

As far as the Berber community is concerned, there is no accurate consensus about the exact number of berberphones. However, (Chaker, 1998) estimates that the native Berber speakers represent 30% of the Algerian population. In doing so, the largest segment of the Berber community can be numerously found in the 'Grande Kabylia' where four administrative departments are situated in: Tizi Ouzou, Bouira, Boumerdes and Béjaïa.

2. Diversity in Regards to Native Languages

Language is a safeguard of human's cultural and linguistic heritage. Its existence is occupied by a number of factors. In order to reach an awarded position, it must be competitively stood in a mere living atmosphere where speakers tend to use it even for informal daily interactions. When speakers are compatible with the

motives behind its use, they sense the feeling of nationhood if the language is a national on the one hand and inedible attitudes towards ethnic and cultural distinctions on the other. To be blunt, the era of globalization so far proves a populace impact upon endangered and even indigenous languages. The 'one' world order model gives rise to the birth of hegemonic languages. As such, the neo-colonialist favouring of even English or French seems eminently to open a window of controversy.

Diversity has become a universal norm. The promotion of endangered languages is dictated to take back seat to their original speech communities. Ethnic identity represents a basic footstep towards cherishing one's own language. It seems reasonable to add that, both ancestry and language origins are directly linked to self-esteem. So, a person cannot feel the social membership without speaking the language that deciphers such a group. To this case, the linguistic market differs radically from the current situation of endangered languages. However, this makes the situation worsened if the language spoken cannot afford an access to public and business communication. The question that merits to be asked is that how people would deal with linguistic assimilation at the expense of a local language? By virtue, any language whether being a world language or an ancestral one should lead to affective communicative outcomes otherwise, it will never bore fruit.

By 1989, the constitutional reforms that had been initiated by president Chadli led to the creation of the Berber-based political party (RCD). Indeed, the reforms were purely based on the need for the recognition of Tamazight as a national language. Furthermore, the world Amazigh congress was created by the year of 1995. Initiatives for Tamazight paved the way to "raise the Berber identity consciousness" (Chaker,2001,p.137). Also, the year of 1990 witnessed the creation of the Amazigh language and culture department in Tizi Ouzo. One year later, on October 1991 a second department was installed in Bouagi (Ibid,p.138). The aforementioned political initiatives aimed at glossing out their invested efforts to honor Berber with a better position. Yet, the whole situation of Berber in education was subjected to pressures which are tightly tinged with political motives (ibid, p139). As a matter of fact, initiatives of such kind could not reach satisfactory results to preserve Tamazight as an endangered language. However, for an unstandardized language, progressive footsteps should be compatible with developed methods of language standardization. For this to happen there will be a huge need to a successful institutionalization and hence solid corpus planning. Without doubt, Berber proponents hold great expectations which can only be portrayed at the practical level. The status of any given language is bound up with either efficient or jeopardized language policies.

As any mother tongue, Berber language advocates have never ceased their calls to integrate their language into the educational system. In order to preserve a language, it should initially gain ground in the educational system. By 2005, Berber was included with 3hours of instruction per a week (Benrabah, 2007b,p.77) as a subject of instruction. It is worth mentioning that Berber was firstly introduced in 2005. However, teaching Tamazight has not yet reached the entire territory of Algeria especially in non-Kabylian regions.

3. Berbers' Call for Recognition

Through re-considering the linguistic situation of Algeria bearing in mind its cultural diversity, Albirini

(2016, p.7) highlights:

Language attitudes are an integral part of the study of language and key to understanding an important dimension of its sociolinguistic context, namely, the common beliefs about the language varieties used by speakers in a given speech community.

It is not erroneous, though, to maintain that language which has not gained a wider communicative dimension is a useless one. In parallel, given to a language is triggered by the factors that exist within its environment. Tamazight speaking community as an instance has launched a campaign for legacy and mere sovereignty. Therefore, the language has been able to stand alongside Arabic at the constitutional level.

Since Berber is a native language of about ¼ of the population (Chaker, 2004) it is indeed legitimate to raise the demand for its recognition. However, this struggle has been a plight for berberphones in particular. On March 10th, 1980, the Algerian authorities banned a lecture of the novelist Mouloud Maamri. This event had been leading to massive riots by demonstrators whereby they called for a linguistic and cultural recognition. Since all decrees and ordinances stood in favour to Arabization, it was merely "accused" of trying to exclude the Berbers, who at last prefer French to Arabic. (Djité, 1992,p.22). The Arabization policy had increased tensions between arabisants and berberphones as far the language dominance is concerned. This was an opposition against ethno-linguistic plurality. Berbers' aspirations towards their language were sacred. Yet, while these ambitions were loudly raised, in 2002, Tamazight was finally made 'national' language.

المادة 3: تمازيغت هي كذالك لغة وطنية

Article 3: Tamazight is also a national language.

Despite its categorization as a national language, Berbers have never ceased their adherence towards Tamazight. At last, it has been institutionalized as an official language besides Arabic in 2016. As stated below:

المادة 4: تمازيغت هي كذالك لغة وطنية و رسمية

Article 4: Tamazight is entitled national and official.

The Berber culture is rightly so perpetuated to be a fundamental element of Algerian identity as cited in the constitutional amendment of 1996.

Integrating the mother tongue within the educational domain is prone either to developing the sense of belonging to one's own culture or yielding to intolerance towards other languages. Children may feel trapped between intermingling case of the "native language" and the supposed learnt language generally referred in this context to Standard Arabic (henceforth SA).

Benbouzid, one of Algeria's ministers of national education is among the pros of Berber whereby it has been introduced in both BEM exams by the year of 2007 in addition to including it in the Baccalaureate examination a year after. It should be assumed that the political discourse intended to forsake the status of Tamazight at schools remains a bone of contention. Nevertheless, the problem raised here centers around the problematic tinged to Berber as being a dialect and not a standard language. Attitudes towards Tamazight may not solely change to positive if it is only displayed through road signs and administrative ones. A well-designed careful corpus planning can effectively enhance the image of Tamazight as a "language".

Political decisions in regards to languages are a question of power of decision-makers to either promote or

sideline a given language. The linguistic scenery is shaped by the quest for decreeing the status and uses of languages which may negatively respond to the population sociolinguistic aspirations. Since languages are human means of social interaction and everyone self-identification of both identity and culture, we can point out that Tamazight has been awarded little currency compared to Arabic or even French. If we go by the fact that minority languages are affected by stigmatization, at a practical level, Berber proponents, those who belong to the elite class solicited their battle towards recognition by increasing publications and hence readership. The majority of Berber writers favoured to choose French as a medium of expression. Chaker (1997:p82) asserts that

Il est certain que l'influence française a été particulièrement forte en kabyle-y compris chez les nationalistes kabyles qui rejetteront plus tard la tutelle coloniale mais qui empruntent tous les traditions républicaines française.

The impetus behind gathering link with the French language by Kabylians lies with the fact of considering such a language as a tool of expression despite being the language of the enemy.

4. Corpus Planning: Issues of Standardization

In spite of the officialisation of Tamazight, there is an absence of an elaborative corpus planning. This language has not yet found an adequate transcriptive system. Scholars have initiated its codification process. Two interesting pieces of work have been introduced by Mouloud Maamri (Tajerrunt n tmaziyrt (tantala taqbaylit) in 1976 and also Almawal which is basically a twofold dictionary (Berber/French, French/Berber). Maamri is the first linguist who effectively reproduces a systematic grammar. Afterwards, he re-published (Précis de Grammaire Berbère) in 1986. A considerable number of initiatives have been launched, to name but a few, the Berber Academy of Cultural exchange and Research (henceforth ABERC) in 1967. Two years later, it became the Agraw Imazighen under the leadership of Mohand Arab Bessaoud. Additionally, the high commission of Amazighité (HCA) has been created during the presidency of Liamine Zerwoual (1994-1999). It aimed to promote Tamazight language and culture.

Wardhaugh (2006,p.359) contends that "if a community with a minority language wishes to keep that language alive , it is allowed to do so but at its own expense'. Despite the recognition of Berber as an official language by the Algerian institution in 2016, corpus planners are faced with the thorny issue of standardization. In order to make Berber in par with Arabic, this requires huge efforts at least to make a second selection of its writing script. The problems here center on ideological bases. Nevertheless, no official will towards the adaptation of one definite script has been notified so far. Additionally, Abbdelrazak Dourari, a director of the national teaching and linguistic center for Tamazight (CNPLET) advocates the use of Arabic script. This may be due to the fact that the greatest majority of Algerians are arabophones. Within the same line of thought, Kamal Nait Zerrad argues that arabophones would better be tolerant towards Berber only if the Arabic script is used. Unquestionably, the official recognition of a minority language without a census about its corpus planning will spell failure over it and hence curtail the ground of codification enterprise. It's relevant to recall (McDougall,2003,p.8) words who maintains that

the dynamic versions of Kabyle political life and community organization- whether in explicitly political and partly apparatus, more diffuse cultural orientations and demands on, yet more broadly , the enactment

of Kabyle community itself is explored in three arenas; the local, national and transitional whose complex interrelationships are delineated.

The obstacle perhaps today for Berber is the issue of standardization that is still far-fetched. The problematic goes back to the type of script to be selected. Berberphones prefer the use of either Tifinagh or Latin. On the counter part, Berber arabophones find the Arabic script more convenient. According to (Tilmatine & Suleiman, 1996) there are twelve variants of Tifinagh distributed over the Berber groups. (Grandguillaume, 1996.p17) affirms that

The daily spoken languages in the Maghreb are not written, but they are exclusively oral. These are regional dialects either Arabic or Berber. They have been put into an opposition, principally with Arabic dialects with an essentially written mode. (Or orally limited to both scholarly and religious uses) called classical or literary Arabic. This opposition is universal in the Arab world. (Author's translation)

Arabic advocates believe that both Berber and Arabic share similar characteristics as far as the writing system is concerned. They mostly go further to argue that while the Algerian society is mostly arabophone, choosing the Arabic script would be undoubtedly a great option especially for learners at schools. On the contrary, many scholars suggest the use of Latin script. For them, Tamazight needs to be internationally known and therefore only Latinization could make it possible. The process of Latinization is said to be firstly introduced by Jean Michel de Venture de Paradis, he opted for the Latin alphabet to transcribe Kabylian and Chleah varieties. To mention, the Latin script is widely used in the regions of 'great Kabylia' unlike the Arabic one which is dominant in areas such as: shawiya, batna and khenchla. Ideology is what makes the process latent in nature. What is of paradox is that those who desire the choice of Latin script are majorly francophone elites.

4.1What Alternatives?

(Baker, 1992, p.10) reports that 'the status, value and importance of a language is most often and mostly easily (though imperfectly) measured by attitudes to that language". Built upon this quotation, attitudes towards a language be it foreign or native depend mostly on ideology. They cannot be revamped easily unless critical analysis is made. Berberphones, had not been pros to Arabization itself, but, rather against its imbalances that tended to favour one language at the expense of another without paying a sizable attention to the fact of diversity. At a practical level, Algeria is multilingual. We can notify that the stability of its linguistic situation has witnessed a flux of changes. Dialectal Arabic for instance is the mother tongue whereas classical Arabic is a variety that fits sophisticated and academic circumstances.

Looking at the case of France, several minority and regional languages co-existed side by side such as: Breton, Basque, Occitan, Flemish, Catalan, Corsican and Franco-Provençal (Wardaugh,2006, p.362) though, the official de facto language of the country is French. The issue of minority language survival and demands for institutionalization are not solely limited to newly decolonized state. Yet, this seems to trigger a plethora of conjectures in regards to spreading the feeling of inferiority among endangered languages speakers. (Weinstein,1990,p.14) argues that

Language policy and planning can assist efforts to change a state and society in a radical way: changing identities, replacing one elite by another in a state apparatus and altering patters of access to reflect

replacement of a dominant class or ethnic group.

As a matter of fact, the promotion of minority languages implies a breach in the linguistic form designed by planners. Basically, only one language is benefited from the privilege of being dominant throughout all walks of life. Likewise, in 1928 Ataturk outlawed any use of Arabic script as far as Turkish is concerned. (Wardaugh, 2006, p.362)

All in all, decolonized nations tend to share a common idea of returning back to their roots by selecting one "language". This concern arises an important point to the surface which can be subsumed under the following challenge: (i) imposing the one-mold of 'national language' (ii) disheartening the minority by marginalizing their language. (iii) Demands for recognition become a question of dissimilation. (iv)The spread of linguistic discrimination.

It is worth to note that languages are condemned to survival, maintenance or even loss and death. As far as Algeria is concerned, Arabic at one hand has been the safeguard of the national Algerian identity meanwhile Berber runs counter to the interests of non-berberphones. Arguably, there is an equal status assigned to minority languages faced with the current situation of Berber as only a dialect. One might assume that even Arabophones dismiss the value of Algerian vernacular Arabic. Most attitudes reveal the fact that the dialect is a corrupt version that can be hardly compared to SA. It is rare to hear projects which go in favour with promoting vernaculars.

Within a globalized era, in order for a language to be persistent in front of the world changes, policy-makers would strictly stretch the contours of the way through which a language can lead to socio-professional opportunities. Endangered languages face the threat of extinction due to the hegemonic imposition of world languages. To impose a given language with whatever means is an issue that has increased in intensity and hence brought to light a new juncture away from patriotic beliefs, but, rather it is of a purely practical approach for a successful language planning.

Any language that could not reach a codified system tends to witness plentiful vagaries as far as the context it belongs to is concerned. So as for Berber to be omnipresent amidst Arabic and French, it needs first to establish a solid system of orthography and terminological dictionaries, in addition to effective language documentation. This is very challenging for a language which has not yet agreed upon a clear written mode. Linguistic corpora would give a boost to the language itself. Any language should be set on motion only if it is already taught at schools. It is hoped for Berber to adapt Tifinagh as a writing script so that it could generate positive attitudes from the non-speakers of Tamazight as they represent the majority of the whole population.

5. Conclusion

Berber is recorded to be one of the oldest and authentic languages in North Africa. It has weighty become a subject of concern to the ongoing language investigations. In Algeria, despite being elevated to the status of an official language, Berber is still encapsulated within the debate of its codification. Once alerted, sufficient efforts and maintenance should be implemented so as Berber could be a language of utility for the current and future generations. The school meanwhile teaches languages to be affiliated to today's world.

However, the fallacy that stands against Berber results from the motive behind its utility and what could learners achieve through learning it? As mentioned earlier, the native language opens windows of both cognitive and affective development besides being a means of communication.it is perpetuated to preserve the ethnic identity.

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Can Ease of Use and Usefulness perception be influenced by physicians characteristics in the adoption of technology innovations?

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Abstract

Ease of use and Usefulness are the two attributes of Technology Acceptance Model – TAM. These attributes are the basis of this article that comprises the results of a survey with 221 physicians located at Santa Casa de Misericordia de Santos - SCMS, in the state of São Paulo, Brazil regarding the use of an innovation technology tool like Electronic Medical Record. The method was based on a questionnaire specially developed for this study, based on the literature review and the results show that the younger and the newer to the profession, besides those who began to use voluntarily and those who had academic preparation to use this kind of tool showed greater perception of both attributes, what led them to a faster adoption of Electronic Medical Record and its funcionalities like clinical decision support and big data. It was also identified that gender, amount of training and instructors do not influence the perception of attributes leading to adoption, but the familiarity with informatics influence the perception of ease of use as though as professional ties influence the perception of usefullness.

Keywords: Electronic Medical Record, Technology Acceptance Model, Sociological behavior.

Introduction

The Technology Acceptance Model – TAM was developed by Fred Davis and indicates the existence of two attributes: ease of use and usefulness, which, when perceived by the users, induce a behavior leading to the adoption of the technological innovation.

Usefulness is the perception an user has that the technology presented may help him or her to better perform their work and ease of use is the degree to which a person perceives being able to use a particular innovation with minimal effort to learning and adaptation. (Davis, 1989)

Davis points out that external variables to an information system, such as: system features, co-workers influence and achievement of goals, lead to the perception of these attributes.

TAM has been improved with the contributions of Venkatesh, in 2000 and Venkatesh and Bala, in 2008, who added inductive motivations to the usefulness perception, such as: professional image, job relevance,

output quality and results demonstrability. (Venkatesh, et al., 2000), (Chuttur, 2009)

Neumeier (Neumeier, 2013) reports that, despite the benefits gained with innovation technologies such as EMR, its adoption has been slow and highlights that there are many potential barriers to its implementation, with the most notable being the ones related to the change management.

This article aims to present the results obtained in a survey performed on the physicians working at Santa Casa de Misericordia de Santos - SCMS, in the state of São Paulo, Brazil, to gather their perception regarding the use of EMR based on the attributes of the Technology Acceptance Model, because, although physicians have been gradually adopting this kind of tool, not all of then know how to obtain the best from it. Features such as clinical decision support, data collected from wearables and artificial intelligence are underused and can be better explored if the different characteristics of physicians in the perception of ease of use and usefulness are considered.

Objectives

This study aims to identify the perception of physicians at SCMS regarding to the two attributes of TAM.

SCMS was founded in 1543 and is the largest hospital in its metropolitan region. It receives patients from the nine cities that compose the region and also from adjoining cities; it has about 660 beds; more than 3,600 professionals and a clinical body of 480 medical doctors, being a reference in traumatology, cardiology, nephrology and ophthalmology. (Santa Casa de Misericordia de Santos, 2015)

This hospital was chosen for this study due to its characteristics and its similarity with other healthcare facilities linked to the Brazilian Confederation of Santas Casas de Misericordia, Philanthropic Hospitals and Entities – CMB, which includes about 1,787 institutions with similar characteristics and which may benefit from the obtained results.

The Electronic Medical Record system was adopted in February, 2006 and its use became mandatory from August of the same year. Currently it is available for all the hospital departments, although not all the functionalities are fully in use.

Materials and Methods

This explanatory study aims to identify the correlations between the variables: age, gender, time from graduation, time working at SCMS , degree of familiarity with informatics, mandatory usage, professional ties, length of training, instructors involved and academic preparation, and the attributes of Technology Acceptance Model (ease of use and usefulness) by means of a quantitative approach, in order to discover if the perception of physicians using EMR, towards these attributes, are influenced by the former.

The 480 medical doctors included in the official listing of the SCMS clinical staff received a printed questionnaire and, among them, the ones who had an e-mail registered in the organization, received also an invitation to respond to the questionnaire, alternatively, on the Web. Banners were distributed to the places highly frequented by the physicians and, one month before the collection deadline, the Clinical Director sent out an official communiqué urging the physicians who still had not taken part, to participate on the final stage and fill the questionnaire. With these actions the response rate was 46% (221).

The questionnaire was elaborated with multiple-choice questions based on variables collected on the

literature review. Divided in three parts, the first one serving to identify the respondent (4 questions), the second part was directed to the doctors who self-identified as users (18 questions) with the goal of characterize them and identify the facilitating and hindering factors perceived by these professionals in the use of the system, and the third part was directed to the ones who self-identified as non-users of the EMR (4 questions).

The questions of the second part were formulated affirmatively and graduated on the Likert scale in a numerical range from +2 (full agreement) to -2 (full disagreement).

After the 120 days of data collection period, the data went through a preparation that consisted on: 1. Complementation of information left blank; 2. Data entry and consistency check with the returned envelope count, and age and gender totals; 3. Preparation of data, due to requirements of the software used for analysis.

Once the data was prepared, the study advanced to the data analysis phase, considering first the identification of normal distributions for the definition of tests to be used. This first step was performed based on the Shapiro-Wilk normality test, which results ($p<0.05$), led to the use of non-parametric tests for the analysis of correlations between variables.

Therefore, Spearman Correlation tests were used to verify the relationships between quantitative variables, such as: age, time from graduation, time working at SCMS, degree of familiarity with informatics, length of training and the attributes of TAM. The tests resulting in p-value < 0.05 indicated the existence of the correlation between variables and attributes. The Spearman "S" complemented the results indicating if the correlation is positive, that is, the higher the characteristic indicator for the doctor, the higher the perception of the attribute.

For the verification of correlation between quantitative and qualitative variables with two groups, to wit: gender (male or female), mandatory usage (voluntary or mandatory) and instructors (yes or not), the Mann-Whitney test was used and the groups median indicated which of them tends to each end of the Likert scale.

Finally, the Kruskal-Wallis test was applied for the verification of relationships between the quantitative and qualitative variables with three or more groups, to wit: professional ties (residents, outsourced personnel and employees) and academic preparation (at least one class or lecture, one class along one semester, no classes and "I don't remember"). The result was also measured based on p-value < 0.05, indicating the existence of a difference between the groups and the tendency for each group was examined based on multiple comparisons of p-value.

Results

Among the 221 respondents, 169 (75.47%) was self-identified as EMR users and 52 (23.53%) as non-users. The physicians that made up the sample are, on average, 48 years old, with 22 years since graduation and work at SCMS for 19 years. The majority (76%) are hired as freelancers or outsourced personnel, began to use the system voluntarily as soon as it became available (76%), after a single training session (67.4%) headed for the most part by the internal IT team.

A noticeable piece of data is that 72.7% of the physician users reported not having received even one class or lecture about electronic patient records in their graduate or postgraduate training, which is not surprising,

since Meade *et al.* (2009) remind that most of the current crop of physicians graduated before the arrival of this kind of system and graduation courses usually take a relative long time to adapt to the needs of the marketplace. (Meade, et al., 2009)

Analysis of the Correlation between Physicians Characteristics and TAM Attributes

For the comparison of the TAM attributes, the question indicative of complexity perception of the EMR use was formulated to identify ease of use and, considering that the term usefulness may be understood in a wide range, the question that indicated better treatment quality was formulated. The influence of each variable can be viewed below (Table 1):

Table 1 - Influence of physicians' characteristics on TAM attributes perception

	Age	Gender	Time from Grad.	Time at SCMS	Famil. w/ Inf.	Mand. use	Prof. ties	Length of Train.	Instruc-tors	Acad. Prep.
Ease of use	●	○	●	●	●	●	○	○	○	○
Usefulness	●	○	●	●	○	●	●	○	○	●

Legend: ● *Influences;* ○ *Do not influence*

The results of the correlation of variables age, time from graduation and time working at the hospital with TAM attributes indicated that the younger ones have a higher perception of the attributes, which means they tend to adopt HER earlier.

The gender variable has also not presented differences between groups, as well as the length of training and instructors responsible for training.

The correlation of the degree of familiarity with informatics to the attributes ease of use and usefulness yielded a value of $p<0.05$ only for the first attribute, indicating therefore that the most familiar ones have a higher perception of ease of use, while for the perception of usefulness the familiarity with informatics is not statistically significant.

Among the ones who started using voluntarily and the ones who started after it became mandatory, there are also perception differences. Although the medians have resulted in equal values (1.00), the difference can be observed on the averages. The ones who started voluntarily have a higher perception of ease of use and, regarding usefulness, seen from the view of patient care quality, the average of the ones who started voluntarily (1.12) compared with the average of the ones who started after it became mandatory (0.35) points to a higher perception of usefulness among the volunteers.

The three types of professional ties: residents, outsourced personnel and employees do not see a difference in the perception of ease of use, but perceive in different ways the attribute usefulness of the system. Considering the average of the postings, the residents have a higher perception of usefulness (134.0) than the outsourced (87.2) which, in turn, have a higher perception than employees (71.7).

Regarding the academic preparation for the use of an EMR system, the surveyed physicians perceive in different ways the attribute usefulness ($p<0.01$) and the mean rank indicates that the ones who had one or

two classes or lectures about the theme electronic medical records have a higher perception of usefulness (110.41) than the ones who didn't have any information during their period of graduation or post-graduation (79.49).

Discussion

In this survey, as previously mentioned, significant differences between genders were not observed, however, a study by Ma and Yuen (2006), regarding the perception of ease of use and usefulness by professors of both genders reported that women are influenced by both attributes in a balanced way, while men are more strongly influenced by the usefulness attribute.

With a lesser degree of similarity to this study, since it was based on the Theory of Planned Behavior, different results were gathered in a survey by Morris, Venkatesh and Ackerman (Morris, et al., 2005), in which the authors detected that the differences between men and women in the technology acceptance process accentuate with age.

The same authors highlight also that older women are more strongly influenced by social rules of their environment, a variable denominated on TAM 2 as Subjective Norm, while for men this factor has little influence.

Venkatesh and Morris (Venkatesh, et al., 2000), in a study with 342 workers who had initial contact with a new software, demonstrated that the usefulness perception is more accentuated on men, while the perception of ease of use is more evident to women.

Length of training, in particular, presented as little relevant for the perception of these attributes, which does not mean that the training is unnecessary, but just that the number of sessions has little influence on the perception, corroborating therefore study performed by Morton and Wiedenbeck (Mortom, et al., 2009) who also used TAM and Diffusion of Innovations as a theoretical basis for their survey and detected the influence of the training variable on the perceptions of usefulness and ease of use is not statistically significant.

Also reported low or no statistical significance the correlation between training and perception of ease of use and usefulness, Gadd and Penrod (Gadd, et al., (2000), in a survey with doctors after six months from the implementation of an EMR system, and Abdekhoda *et al* (Abdekhoda M, 2015) in a TAM-based survey in an Iran universitary hospital.

Another study performed in two hospitals, one of them in Brazil and other in Spain, by Farias *et al* (Farias, et al., 2011), detected that the higher the knowledge of informatics of the professional, the higher the chance for adaptation to the use of EMR. This result was confirmed by van der Meidjen *et al* (Van der Meijden, et al., 2001), who identified the previous experience with informatics as a determining factor for the acceptance of an EMR system. In the present study, considering that the perception of ease of use were more strongly observed by the users with higher degree of familiarity with informatics, it's possible to infer that these users tend more strongly to adhere to the use of this kind of system than the ones who do not have this perception.

Conclusions

As can be seen on Table 1, the IT Team has to pay attention on younger and newer at the institution, as well as those who began to use voluntarily and motivate them to influence their peers to the adoption of EMR. Other influencers must be those who have more familiarity with informatics, residents and outsourced personnel, that can integrate the training and deployment team. Important note is that the length of training does not interfere on physicians' perception towards both of TAM attributes, but cannot be discarded. Considering that the current study had as reference a single healthcare institution, its findings are limited to that institution. Nevertheless, since the beginning of the work it was known that other institutions have the same problems to disseminate the adoption of EMR and promote the use of all its functionalities and, surely, the results obtained will serve as a reference for these entities in other parts of the world.

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Strategic information quality utilizing the House of Quality

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Abstract

Living in the Age of Knowledge means living in search of innovation. That is, quality information and high valued added knowledge that can lead companies and individuals to the spotlight in a highly competitive and globalized world. Information is considered to be raw material for creating knowledge, which in turn, adds value to organizations, promotes innovation and puts the spotlight on organizations. For this reason, the objective of this study is to use a tool to analyze the quality of organizational strategic information in two phases. In the first phase, data and sources will be assessed; and in the second phase of the tool, strategic information and information guidance practices will be analyzed. Thereby, the study provides analyses of an organization a step-in advance, so as to improve its processes and tools to truly transform its strategic information into competitive advantage.

Keywords: Information Quality; House of Quality; organizational strategic information.

1. Introduction

Living in the Age of Knowledge means living in search of innovation. That is, quality information and high valued added knowledge that can lead companies and individuals to the spotlight in a highly competitive and globalized world.

As punctuated by Fialho et al (2010), this is the era where information and knowledge become "competitive weapons." Thus, organizations must be focused on building their knowledge base.

Passos (1999, p.59) says that companies are characterized as "socio-technical [...]: socio, referring to a set established social relationships [...], and technical, referring to the body of knowledge, coded or not, that leads human beings to act". Therefore, managing knowledge which is implanted within the organization will allow existing strategic information to be coded, organized, stored, and reutilized. Further, new knowledge may be developed based on this body of knowledge, granting the organization competitive advantage.

Introduced in his work called "Knowledge Management", Terra (2000) presented seven characteristics that organizations must have for managing knowledge: organizational culture; strategy and high management; organization and work processes; policies and practices for managing human resources; information and communication systems; performance evaluations, and hands-on learning.

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According to Fialho et al (2010, p.43), "information is a necessary means or source for extracting and building knowledge, which, changes through new contributions or restructuring." Guaranteeing adequate technology for storing, sharing, and recovering knowledge is as important as certifying that it will suffer no semantic loss. Knowledge must be conceived, stored, and shared alienated from the various contexts in which it travels; also, it should be independent from the deliverer or receiver who will use it (GOMEZ, 1993).

Santos and Valentim (2015) consider that organizational information, that which involves business development, must be properly managed. It is the foundation for new product development, improvement of quality and productivity, better services offered, and the guarantee for the most accurate decision making.

Woiciekovski and Pereira (2015) argue that regardless of the type innovation (product, process, or service), for a company to be successful it is necessary to identify the opportunity and understand the strategic information that will support the implementation of this innovation. In the same manner, Teixeira and Valentim (2016) point out that once an organization has analyzed its data and information and filtered strategic information, it will be possible to add value and generate knowledge that will allow for improvements for the organization and implantation of innovation.

Leal (2012, p.34) discusses services quality and highlights that "companies are directed towards the valuation of intangible assets, those which enable them to be directly connected to clients, defining their needs, targeting new markets, innovating and raising product quality."

Considering what was previously exposed and what Jabar and Alnatsha (2014, p. 1) punctuate, that "quality of knowledge is a matter that needs to be brought to light in order to guarantee the effectiveness of knowledge management," the following questions comes to light: how can organizational strategic information be analyzed using the House of Quality?

2. Information Quality and the House of Quality

Sirihal and Lourenço (2002) affirm that information and knowledge have been approached in different manners. While scientific areas develop the concept of information, the humanities area, in turn, points to information as raw material for knowledge, considering both to be competitive instruments for organizations.

Authors such as Prusak and Davenport (2003) and Uriarte Junior (2008) make a distinction among data, information, and knowledge. The first, is symbols without context; the second, symbols with context; and the third, comprehends pattern recognition and its implications on information, respectively.

Obtaining information quality in hypercompetitive economic times, propelled by value added to intangible assets, reduces uncertainties and costs of poor quality related to decision making. For Bazzotti and Garcia (2007), decisions made with precision lead to company success, and they are obtained through the utilization of strategic information. Expanding on the importance of information quality for organizations, Kandari et al (2011) warns that concern about information quality must be present in every aspect of business.

Paying attention to quality of information is just as important as comprehending what it means. Therefore, Juran (1990, 1993) and Crosby (1979) define quality information as that which is fitness for use, that is,

that which efficiently meets the needs of those who use it (PAIM et al., 1996; CALAZANS, 2008, ALMEIDA, 2009).

Considering information to be a product and therefore having measurable characteristics, the dimensions of information quality are studied by several authors (WANG and STRONG, 1996; WANG et al., 1998; NAUMANN and ROLKER, 2000; EPPLER and MUENZENMAYER, 2002; LEE et al., 2002; ALMEIDA, 2009; LEE and HAIDER, 2011; OSTROWSKI, 2012; FILIERI and MCLEAY, 2013; NASUTION and ALBARDA, 2013; JABAR and ALNATSHA, 2014; AYYASH, 2015; ZARRAGA-RODRIGUEZ and ALVAREZ, 2015). Although there are variations in how they are presented by each author -- sometimes grouped into categories, and at other times presented individually being separated into subcategories as characteristics -- the most prominent dimensions of information quality are: completeness, timeliness, accuracy, accessibility, relevance, reliability and security.

Understanding the importance of organizational strategic information and the dimensions that may guarantee its quality, it is necessary to evaluate its current conditions within the organizations, find gaps and develop enhancements plans. For this process, total quality management tools have been adapted by authors and several other support tools have been developed.

The Quality Matrix, also called House of quality due to its format, is one of the total quality management tools that may contribute to organizational information quality. The development of this matrix is one of the steps in Quality Function Deployment (QFD). It aims to link client needs to technical prerequisites developed by specialist, improving information visibility and ensuring quality at the conception of a product project (OAKLAND, 1994; CHENG et al., 1995; AL-HAKIM, 2004; LIN et al. 2011) Aiming for quality, QFD and the House of Quality are applied in industry, agribusiness, services, as well as in organizational processes. Many of these applications already use other tools in conjunction with QFD, targeting improvements. Diffuse logic has been present in a variety papers that discuss the application of QFD, and it has become an important key term for researching QFD application.

In the search for the correlation between the terms QFD and Information Quality, authors (AL-HAKIM, 2004; PINTO, 2006; WANG et al., 2008; LIN et al. 2011; HAIDER and LEE, 2012) have been adapting QFD and House of Quality in different manners to evaluate information quality. Research they performed has demonstrated that advancements have developed in this field of study. Their findings show that giving proper attention to the needs of the users of this information facilitates the management process and increases assurance in decision making processes, ultimately favoring business development through innovation of products and processes.

3. Information Quality and the House of Quality

The goal is to adapt the House of Quality to verify the quality of strategic information, treating this information as a product. The Kaneko approach to QFD is used in the development of the House of Quality to evaluate the organizational strategic information here presented. Therefore, the first two phases were used in this adaptation period as shown in Table 1.

Table I. Phases of the approach to QFD used by Kaneko for adapting the House of Quality

KANECO APPROACH	Phase 1 Required → quality Elements of Quality
	Phase 2 Elements of → Quality Functions/Processes

Source: Authors (2016)

The House of Quality for Strategic Information Quality is composed of two phases and three matrixes (Figure 1). This proposed composition will allow the user of the tool to have a complete evaluation of the quality of the organizational strategic information. It will allow for the development of an improvement plan that will guarantee the quality of organizational strategic information, adding value to business and ensuring its maintenance and continuation by promoting innovation.

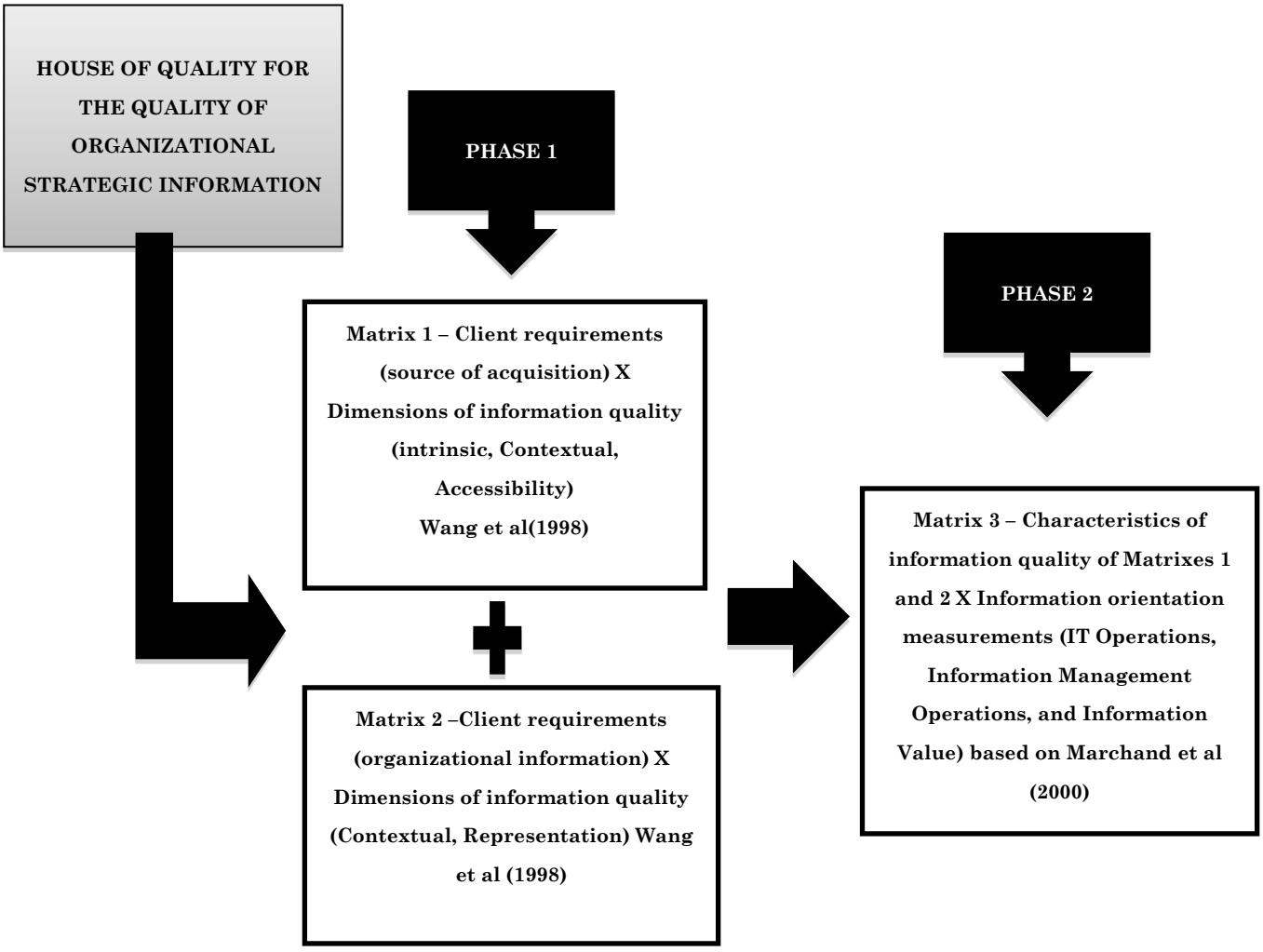
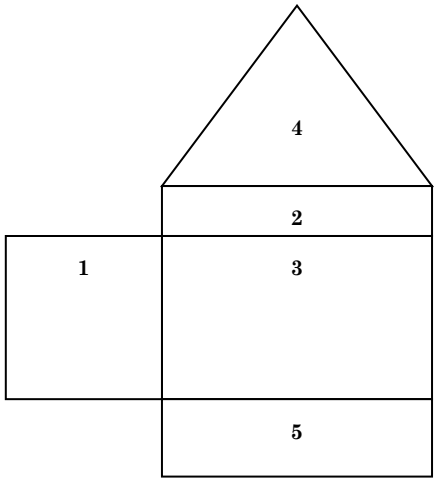


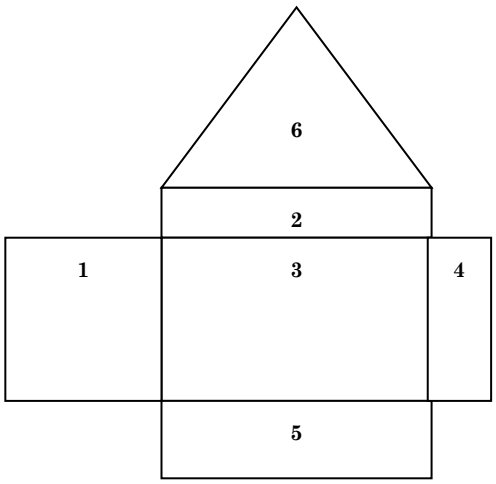
Figure I – House of Quality application steps for Strategic Information Quality

Source: Authors (2016)

In relation to the House of Quality adapted for Information Quality by Lin, Jing e Fang-Fang (2011), the model exposed in this study has and added column beside the matrix which shows the level of importance of each identified piece of information considered by the client to be strategic, presented in Figure 2



House of Quality adapted for Information Quality developed by Lin, Jing e Fang-Fang (2011)



House of Quality adapted for Information Quality developed by Authors

Figure II- House of Quality Structure applied Information Quality
Source: Authors (2016)

The House of Quality for Strategic Information Quality holds the following structure:

1. Left wall: shows strategic information identified together with the client.
2. Maximum limit: shows dimensions of information quality in the first two matrixes, and in the third, guidance practices for information.
3. Center: shows matrix of relation between strategic information and dimensions of information quality in the first two matrixes; in the third, the matrix of relation between dimensions of information quality used in the first two, and in the third presents guidance practices for information.
4. Extreme right wall: shows degree of importance of strategic information as related per the client in the first two matrixes; the third matrix relates the result of the information quality presented at the bottom (5) of the previous matrixes as a degree of importance.
5. Floor: shows value obtained by the total sum of each dimension of the information quality evaluation, where gaps may be identified.
6. Ceiling: shows interrelations between technical requirements, contributing significantly to the final analysis.

For correlations with client requirements, the House of Quality for Strategic Information Quality uses in the first phase fourteen dimensions divided into four categories that address intrinsic characteristics of information: its context, its accessibility and its representation described Wang e Strong (1996), as seen in table 2. According to Bentancourt (2015), authors Wang and Strong (1996) define information quality as "adequacy for use." Further, in a study focused on marketing, they aimed to understand consumer needs and build a hierarchical relation of such needs.

Table II. Characteristics of Information Quality

Categories	DIMENSION
INTRINSIC	Free of error
	Credibility
	Objectivity
CONTEXT	Completeness
	Current
	Value added
	Relevance
REPRESENTATION	Comprehensibility
	Interpretability
	Conciseness
	Conscientious representation
ACESSIBILITY	Availability
	Ease of use
	Safety

Source: Based on Strong et al. (1997), Lee et al. (2002), Bentancourt (2015)

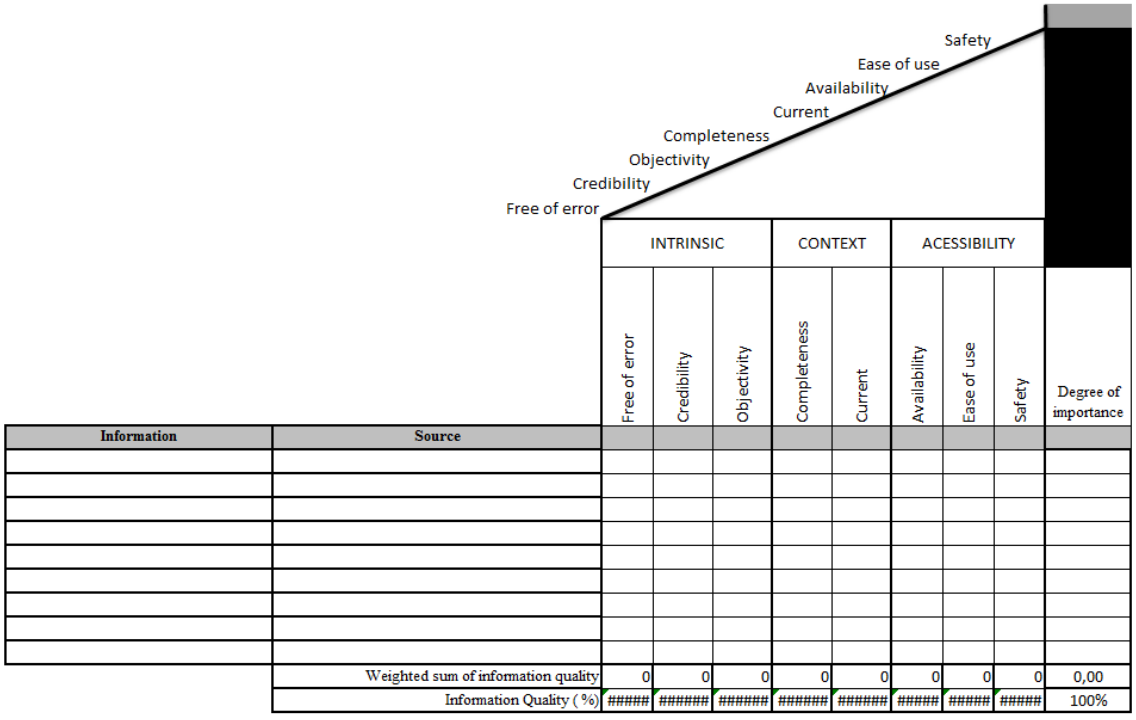
To clarify the relation between dimensions of information quality and information management practices, the measures of information orientation (Table 3) were chosen to be used in the adaptation of the third matrix. These were based on Marchand et al. (2000) (IT practices, information management and management of information value), and demonstrate the relation between business performance and information potential.

Table III. Guidance for Information management

Information Technology Practices	Operational
	Process
	Innovation
	Management
Information Management Practices	Comprehension of business
	Collection of information
	Organization of information
	Information processing
	Information maintenance
Competitive value of information	Integrity
	Formality
	Control
	Sharing
	Transparency
	Proactivity

Source: Marchand et al (2000)

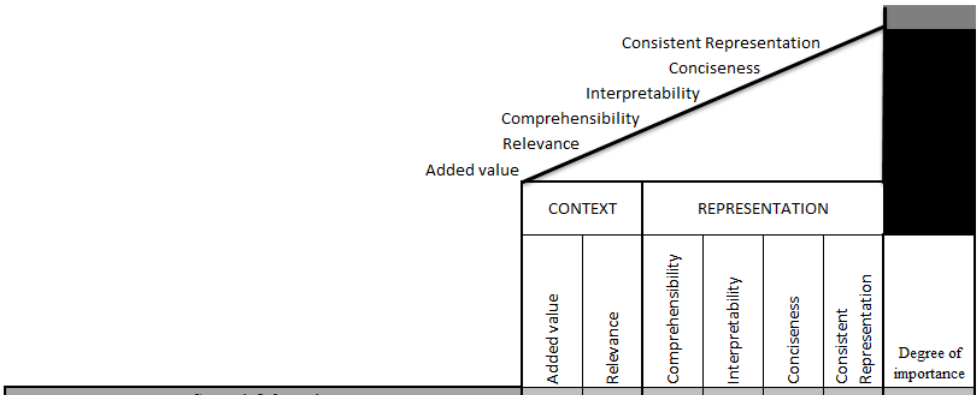
In the first phase (Phase 1) the House of Quality is divided in two instances, both of which correlate client requirements to information quality. The first matrix shows the relation to be more precise between sources of client requirements and the characteristics of information quality related to its availability and acquisition method. The following step is the second matrix. It shows the relation of client requirements and characteristics of information quality that is related to context and method of presentation, as seen on Figures 3 and 4.



		INTRINSIC			CONTEXT		ACESSIBILITY			
Information	Source	Free of error	Credibility	Objectivity	Completeness	Current	Availability	Ease of use	Safety	Degree of importance
	Weighted sum of information quality	0	0	0	0	0	0	0	0	0,00
	Information Quality (%)	######	######	######	######	######	######	######	######	100%

Figure III - Matrix 1 of Phase 1

Source: Authors (2016)



	CONTEXT		REPRESENTATION				
Strategic Information	Added value	Relevance	Comprehensibility	Interpretability	Conciseness	Consistent Representation	Degree of importance
Weighted sum of information quality	0	0	0	0	0	0	0
Information Quality (%)	######	######	######	######	######	######	100%

Figure IV - Matrix 2 of Phase 1

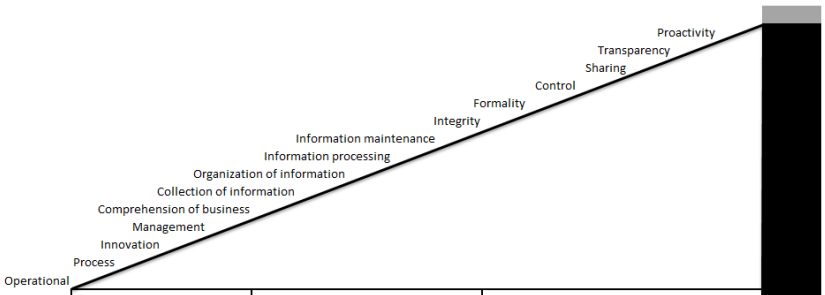
Source: Authors (2016)

In order to find the values of importance of each piece of strategic information suggested by the clients for the mission, vision and value of the organization in question, the suggestion is to utilize a questionnaire

that has a semantic differential scale and uses arithmetic averages of the answers found.

Understanding the level of importance allows for obtaining a focus measurement, a measurement that demonstrates the impact of a given attribute during decision making (SAMARTINI, 2006).

The second construction phase of the House of Quality for evaluating organizational strategic information presents a matrix that relates information quality dimensions of previous matrixes to organizational information management practices, as seen in Figure 5.



		Information Technology Practices				Information Management Practices					Competitive value of information						
		Operational	Process	Innovation	Management	Comprehension of business	Collection of information	Organization of information	Information processing	Information maintenance	Integrity	Formality	Control	Sharing	Transparency	Proactivity	Degree of importance
Intrinsic	Free of error																
	Credibility																
	Objectivity																
Context	Completeness																
	Current																
	Value added																
	Relevance																
Acessibility	Availability																
	Ease of use																
	Safety																
Representation	Comprehensibility																
	Interpretability																
	Conciseness																
	RConscientious representation																
Weighted sum of information quality		0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Information Quality (%)		######	######	######	######	######	#DIV/0!	######	######	######	######	#DIV/0!	#DIV/0!	######	######	######	100%

Figure V - Matrix of Phase 2

Source: Authors (2016)

In this matrix, the values found as a weighted sum of information quality in previous matrixes is attributed as a level of importance for information quality dimensions.

4. Conclusion

According to Fialho et al (2010), information is the raw material necessary for constructing knowledge, being that both information and knowledge are competitive tools for organizations that work in the intelligence market. Especially for service and technology-based companies, knowledge is an intangible asset of the organization, and it is essential in promoting competitive advantage and innovation (ANGELONI and FERNANDES, 2000).

Jabar e Alnatsha (2014) point out that the effectiveness of knowledge management is directly connected to the level of attention a company devotes to quality of knowledge. Further, understanding that information is the raw material necessary for knowledge, and that guaranteeing its quality will assure the company

quality knowledge and effective intelligence management. The objective of this study was to analyze the quality of organizational strategic information by applying House of Quality.

The basis of this study is strengthened when Zarraga-Rodriguez e Avarez (2015) call attention to the scarcity of research studies that relate information quality with its use at individual and organizational levels. Therefore, considering that the tool which was developed and exemplified during this study shows contributions to science in advancing studies that use the QFD methods and information quality, it also applies to studies on organizational knowledge and quality of organizational information.

Within the context of social development, this study offers contributions to organizations, and, consequently, to society around them. Since the possibility of evaluating and improving strategic information quality increases its development, it allows the company to comprehend the importance of knowledge management, incentive to innovation, and to have high value added to business.

Finally, the objectives of this study were met, for it was possible to adapt the House of Quality to analyze strategic information quality. Prusak e Davenport (2003) reiterate that the differences among data, information and knowledge must be clear so that organizations may direct their efforts appropriately. Also, this study was not limited by dimensions of information quality. The tool successfully advanced, separating analysis into information and source, strategic information and organizational knowledge, the last of which was obtained through information quality related to information practices and guidance. These steps allow for a deeper analysis and offers the organization a broader spectrum of options while developing a plan for improvements and quality.

In future studies, we suggest the proposition of tools that assist in identifying organizational strategic information to complement this current tool; bring advancements in results analysis; give the proposition of a tool that helps elaborate specific action plans for improving information quality; perform analysis of parallel cases using statistical analysis of the correlation between results and variables; and, finally, perform validation of the tool and develop a system that enhances its use for organizations.

6. Acknowledgement

This study was financed in part by the Federal University of Santa Catarina, Graduate Program in Engineering and Knowledge Management, and Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (CAPES) - Finance Code 001.

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Modeling of the Certification Process for Physiotherapy services

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Abstract

Gaining attention in all nations, the service sector, among other things, guarantees improved standards of living for the population. When it comes to health services, some accreditation and certification models already exist in the hospital environment, encompassing both these aspects. Currently, in Brazil, a certification model for specific Physiotherapy service providing companies exists, which comprises infrastructure, services, and consumer satisfaction aspects. This article aimed to describe this certification process using the IDEF model for modeling processes. Research results show that the IDEF method allows for a high level of process detailing, and that developing a framework for the certification process for Physiotherapy services provides a better understanding and presents a structured description of the process.

Keywords: Physiotherapy services; Certification Process; Service quality; Health services.

1. Introduction

According to Fitzsimmons e Fitzsimmons (2014), the services sector is notable in all nations, providing not only employability, but also improved quality of life for the population. Divided into different categories, there are types of service that demand a high level of expertise from the providers, among which are health, consulting, and education services.

Also, according to Fitzsimmons and Fitzsimmons (2014, p. 11), "the nature of services economy is undergoing a transformation: from a transaction-based nature to relations based on experience". With that, two observable components of quality in health services are found: operations (transactions process) and client perception as to the customer service that is offered (experience) (BITTAR, 1999).

Observing and measuring quality in services is a complex task, mainly because of characteristics such as concurrence, perishability, intangibility, and multiplicity. For the services sectors, various accreditation and certification models are made available so that companies may guarantee the quality of their products based on preestablished standards. In the services sector, and more specifically in the health services sector, initiatives like ISO standards began around 1924 with the Hospital Standardization Program (HSP) developed by the American College of Surgeons, according to Feldman, Gatto and Cunha (2005).

Over the years, other Hospital accreditation programs have emerged and propagated throughout the world. In Brazil, the National Accreditation Organization (ONA) stands out as the main agency in the hospital

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health area (FELDMAN; GATTO; CUNHA, 2005).

The ability to guarantee quality standards of services offered to clients has become vital for organizations that are part of the globalized market. Certification programs represent a method that facilitates the development of standards for continued improvement of patient assistance and of organizational performance (NOVAES, 2015).

Within the sector of health services are Physiotherapy services, which can occur in a hospital, ambulatory or home environment, and are provided by independent professionals or those who are a part of companies that provide these services. The different explorable scenarios of the profession and the elements that should be observed, such as the professional´s autonomy to develop a treatment plan and adequate conduct for each case, hinder standardization for certification and quality.

Taking these preconditions into account, Mandelli (2016) developed a model for the evaluation of quality in Physiotherapy services, contemplating the perspective of the manager. Presented as a dissertation under the title "Constructivist Model for the evaluation of quality in Physiotherapy services from the perspective of the manager," this model deliberates three broad areas to be observed: infrastructure, services, and satisfaction.

Currently, this is the only certification model in Brazil for quality certification available to Physiotherapy service companies, accessible through the National Federation of Entities of Physiotherapy Service Providing Companies (FENAFISIO).

To comprehend the steps of the certification process for Physiotherapy service providers made available through FENAFISIO, the present article aims to describe this process.

2. Literature Review

This section conceptualizes and presents some characteristics related to process management and process modeling.

2.1 Process management

Varvakis et al. ([20--?], p. 14), define a process as "any activity that receives input, undergoes transformation to add value, and generates an output for an external or internal client." They also point out that when an organization can understand its processes, it gains potential for systemic vision and more easily presents competitive advantages.

Gonçalves (2000, p.7) remarks that "no product or service offered by any given company exists without a business process. In the same manner, it makes no sense for a business process to exist which does not offer a product or service." Thus, it becomes necessary that all such processes be managed, considering their continuous improvement and alignment within the complex system that is an organization.

According to Varvakis et al. ([20--?]), executing process management will allow the organization to continuously improve its activities by identifying necessary support activities, eliminating obstacles, and increasing customer satisfaction.

The notion of processes, initially highly connected to Production Engineering, springs from the premise that activities that comprise processes are composed of input and output. That is, the necessary resources (information, personnel, and technology) are inserted in the activity, which then process and return the activity, resulting in a product or service, according to Figure 1.

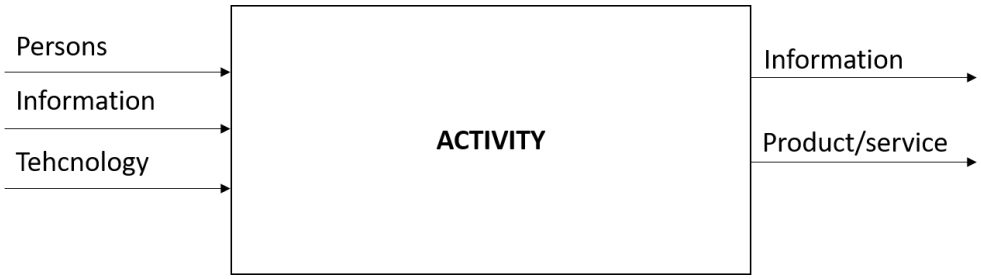

Figure 1 – Activities and their inputs and outputs

Source: Authors (2017)

These activities are related to other activities that compose a process, which in turn, when connected to other processes, form a system. Such existing complexity within organizations demands attention and management. As for the processes concept, Gonçalves (2000, p.7) states that "a process is any activity or group of activities that receives input, adds value to it, and renders an output for a specific client."

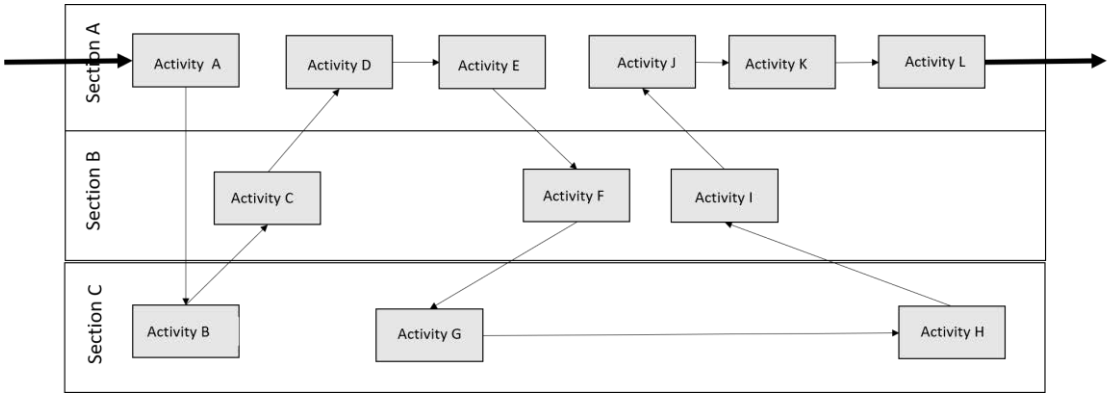

Figure 2 - Organizational process

Source: Authors (2017)

To obtain such knowledge about the structure of organizational processes, creating a model becomes necessary. This can occur in different formats and with different levels of detail, according to the needs of the company. Detailing can occur at smaller levels, when the macroprocess is defined, directed towards subprocesses, and finally, by detailing activities and tasks.

Modeling organizational processes will provide support for managing such processes, allowing involved parties to have a broad understanding and to easily identify obstacles, thus facilitating continuous improvement. The next item addressed this topic.

2.1 Process management

Donadel (2007) believes the representation of processes aims to reproduce the current model or to build an abstraction of organizational processes. Oliveira e Rosa (2010, p. 162), on the other hand, state that "process modeling refers to identifying and diagraming the process as it is executed. It is an activity which is relative to the execution and enhancement of an organizational process." Varvakis et al. ([20--?]), in turn, define modeling or process representation as a combination of graphic elements that yield visualization and understanding of the process.

Different tools or methods may be used for modeling processes, among which are: Traditional Flowchart, Service Blueprint; Service map; IDEF; and CommonKADS – described in Table 1.

Table 1 – Methods for modeling processes

Method	Definition
Traditional Flowchart	"Flowcharts describe the sequence of activities of a business process. Thus, flowcharts use a standard symbology which adopts, among other symbols, rectangles to represent activities, diamonds to represent decision points, and arrows to indicate the direction of flow. These symbols are followed by text that describes the activities and directs the course of the process" (SANTOS, 2000, p. 38).
Service blueprint	Fitzsimmons e Fitzsimmons (1998) apud Santos (2000, p. 39-40), believe that a blueprint is "a map of all transactions that comprise the process of service delivery. This map identifies both the front-end activities and back-office activities, separated by the aforementioned visibility line."
Service map	"the service map tries to integrate the various dimensions involved in service management, from managing the business all the way to the client. To that end, it divides the service processes not only in two parts (front-end and back-office), but into five different zones: client zone; front-end zone; back-office zone; support zone; and management zone" (SANTOS, 2000, p. 42).
IDEF	Based on the Structured Analysis and Design Technique (SADT), Integration Definition (IDEF) is a process modeling technique that allows safe and sustained development, which describes in graphics the entire development life cycle of a system" (OLIVEIRA; ROSA, 2010, p.162).
Common KADS	"A KAD system is represented as a group of models, each representing a part of the system." (URIONA et al., 2008, p. 5). Moreno et al. (2001) describe two main component of KADs: knowledge mastery and knowledge control.

Source: Authors (2017) based on Santos (2000)

Santos and Varvakis (2001) developed a comparative chart (Figure 3) with different process representation techniques, comparing them across five requirements. Among those mentioned, the IDEF 3 adapted method stands out as the technique that meets four of the fives requirements and one of them partially.

Figure 3 – Methods analysis for modeling processes

	PROPOSED REQUIREMENTS				
TECHNIQUE	**Adequate for the project and the analysis of service processes**	**Description of experience of service from client´s perspective**	**Graphic representation based on diagrams**	**Ease of use**	**Support for performance evaluation of process**
Traditional flowchart	●	○	●	●	○
Service blueprint	●	◘	●	●	○
Service map	●	◘	●	●	○
Structure for client processing	●	◘	●	●	○
IDEF0	●	○	●	◘	◘
Walk-through-audit	○	◘	○	●	●
Service transaction analysis	○	●	○	●	●
Adapted IDEF3	●	●	●	●	◘
Representative language for service processes project	●	●	●	○	●
• Meets requirement		◘ Partially meets requirement		○ Does not meet requirement	

Source: Santos and Varvakis (2001, p. 15)

Based on this, the present study proposes to use the IDEF method for modeling the process of Physiotherapy services certification. In the following section, aimed at presenting the research method, the IDEF is explained in detail.

3. Methodological procedures

The search for knowledge about the process included semi-structured interviews with the directors of FENAFISIO. In this phase of the research, their knowledge of the processes was documented for posterior model development. At the time, the president, the quality director, and the financial director were heard, all of whom were directly involved in all phases of the process.

The IDEF method was chosen for the development of the Physiotherapy services certification process. It is a method that allows for a detailed description of a process or system. Developed by the United States Air Force, the IDEF derives from the graphic language of Structured Analysis and Design Technique (SADT) (IDEF0, 2013; SANTOS, 2000).

Since its initial format, the IDEF has developed. Currently, as per Oliveira e Rosa (2010), 14 different formats of IDEF exist, being that the IDEF0 is among the most popular, also used for modeling decision making and organizational processes (Table 2).

IDF Methods	
IDEF0	*Function Modeling*
IDEF1	*Information Modeling*
IDEF1X	*Data Modeling*
IDEF2	*Simulation Model Design*
IDEF3	*Process Description Capture*
IDEF4	*Object-Oriented Design*
IDEF5	*Ontology Description Capture*
IDEF6	*Design Rationale Capture*
IDEF7	*Information System Auditing*
IDEF8	*Using Interface Modeling*
IDEF9	*Scenario-Driven IS Design*
IDEF10	*Implementation Architecture Modeling*
IDEF11	*Implementation Artifact Modeling*
IDEF12	*Organization Modeling*
IDEF13	*Three Schema Mapping Design*
IDEF 14	*Network Design*

Table 2 – IDEF Methods

Source: Oliveira and Rosa (2010, p. 163)

To develop a model using IDEF0, it is necessary to understand its design composed of boxes and arrows (Figure 4), where boxes define the process or activity in question and arrows represent input, controls, mechanisms, and output.

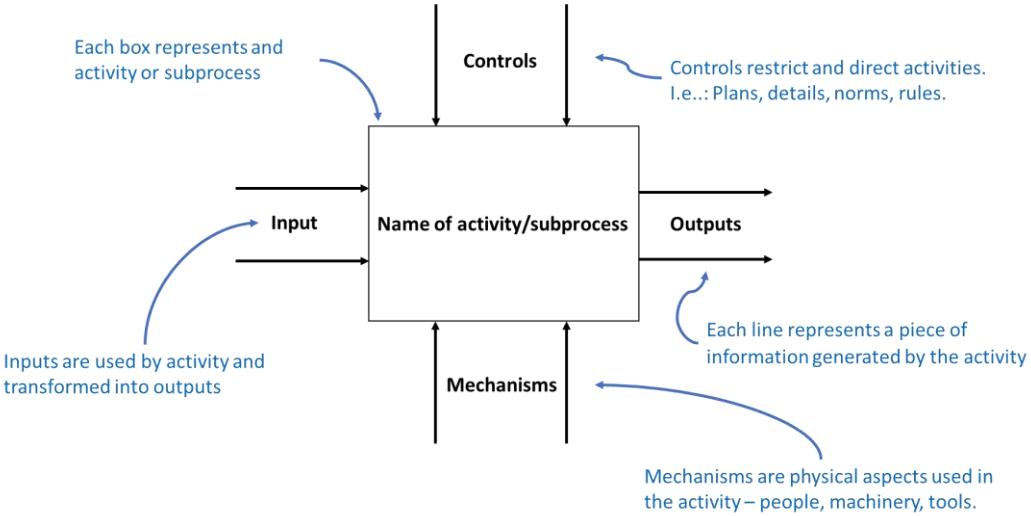

Figure 4 – Basic elements of description for IDEF0

Source: IDEF0 (2013, p. 2)

The modeling process begins with a single box called A0, which describes the process in a generic form. As the A0 box opens and unfolds, the IDEF develops into layers of activity detailing.

According to IDEF0 (2013, p. 3) "this hierarchical decomposition repeats itself for each box of the diagram, and then for each box of the resulting diagrams, and so forth, until the process is fully described," as shown in Figure 5.

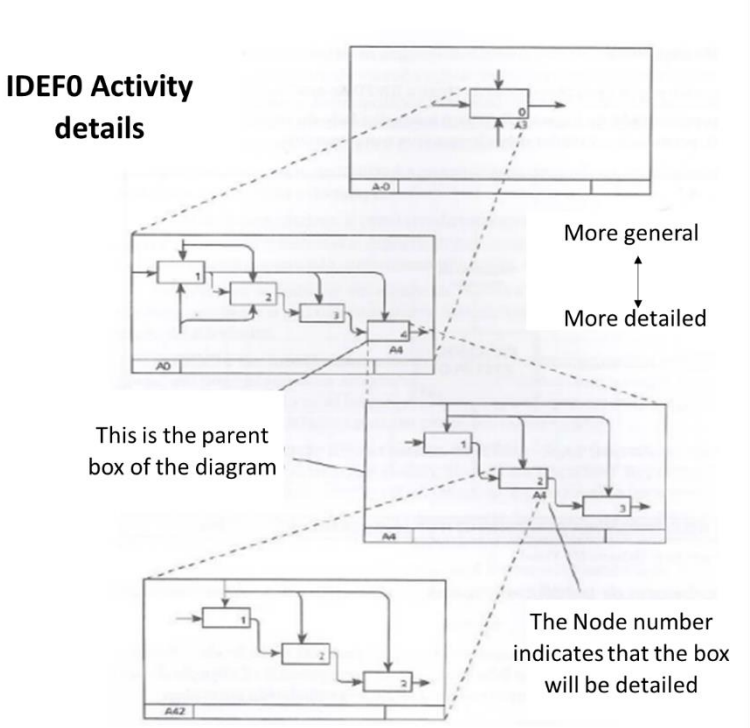

Figure 5 – Details of IDEF0 activities

Source: IDEF0 (2013, p. 3)

It is suggested that the users be identified before beginning the outlining process, as well their level of understanding of what will be represented, point of view after which the process will be modeled, and the decomposition strategy to be used, which may include: functional, documentation, through subsystems, and life cycle (IDEF0, 2013).

4. Modeling of the certification process for Physiotherapy services

4.1 Context of application

Certification is a process through which a government organization or classified association certifies or officially guarantees that an entity or individual has fulfilled certain predetermined qualifications (BITTAR, 1999). It could be said that a certification is a procedure through which an impartial officially recognized entity formally attests that processes, products or quality systems of a given institution are in conformity with specific standards.

Since 1989, The World Health Organization (WHO) has pointed to evaluation programs for health quality as being the strategic element for developing quality in Latin America. In the early 1990s, an agreement was made between the Pan-American Health Organization (OPAS), The Latin American Hospitals Federation and the Health Department to develop the Manual for Accreditation Standards for Latin America (FELDMAN; GATTO; CUNHA, 2005).

In Brazil, by means of the Health Department, the government began to focus on quality through hospital evaluation in the 1970s. Norms and Guidelines were published which regulated mechanisms for the implementation of systems that could evaluate quality of health assistance. However, according to Gonçalves et al. (2010) no attention was directed towards the quality of the services provided.

Currently, in Brazil, there are certification institutions for health, which are private companies responsible for evaluating and certifying the quality of health services nationwide.

In 2016, the National Federation of Entities of Physiotherapy Service Companies (FENAFISIO) began a program for evaluating the quality of physiotherapy services. Its main goal is to propose a program for continuous improvement that offers extended education for service providers.

Nevertheless, so that FENAFISIO may be successful with its quality certification program for Physiotherapy providing services, the proposed process must be thoroughly understood, deeming it necessary to build a model to better understand it.

4.2 Modeling

Following the guidelines described in the Research Method, the process to be modeled, the users and their level of knowledge, the point of view after which the process will be modeled, and the decomposition strategy to be used were identified (Table 3) in order to begin modeling through IDEF0.

Table 3 – Initial information for process modeling

Process to be modeled	Certification of Physiotherapy services
Process model users and their level of knowledge	FENAFISIO administrators – medium level of knowledge Administrators of the validating company– high level of knowledge Clients – low level of knowledge
Point of view after which the process will be modeled	Representation will take place from the same point of view as that of the administrators of the validating company.
Decomposition strategy to be used	"Functional Decomposition – activities according to 'what' is done instead of 'how' they are done." This is the most common strategy" (IDEF0, 2013).

Source: Authors (2017)

Sequentially, box A0 was defined, with a general exposition of the process that will be detailed, as per Figure 6.

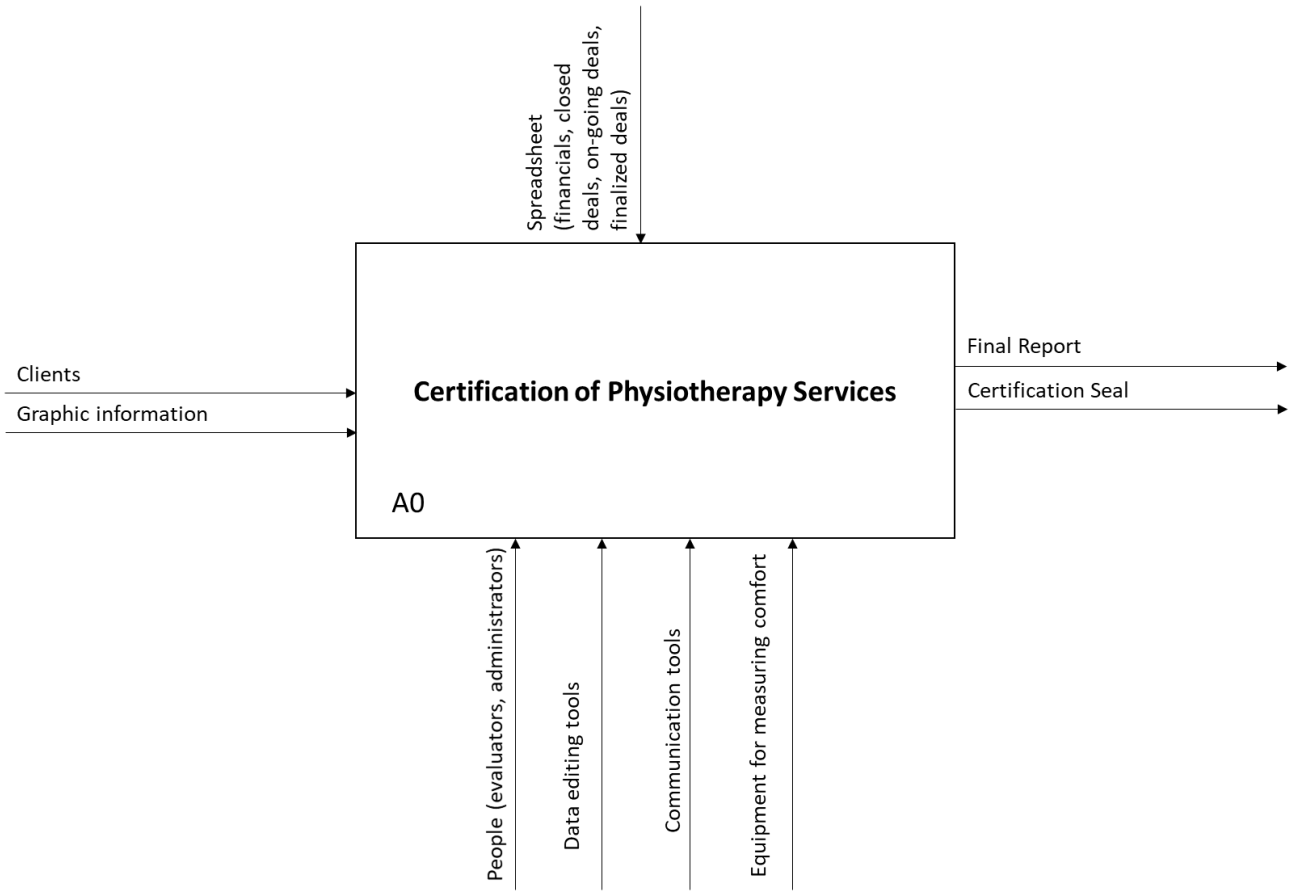

Figure 6 - Box A0 – Description of general process

Source: Authors (2017)

The initial development of the process begins by opening box A1, resulting in Figure 7.

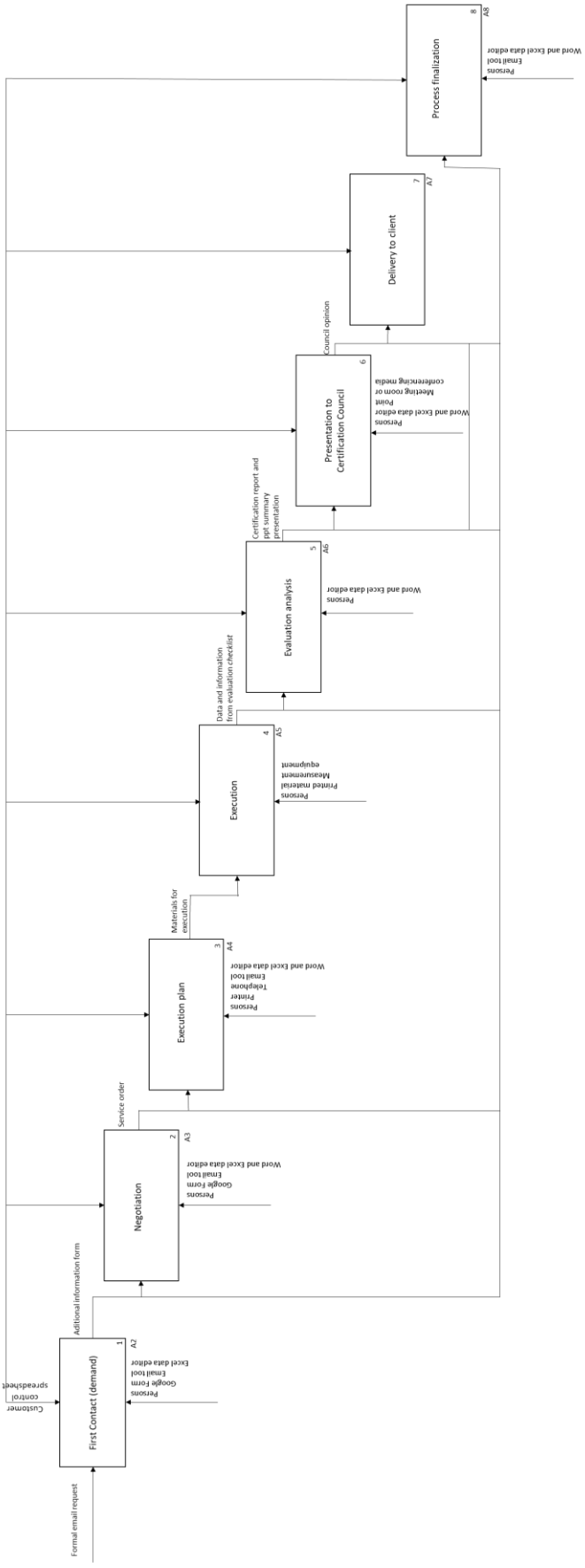

Figure 7 – Opening box A1

Source: Authors (2017)

Eight steps were identified in the certification process of physiotherapy services, which are: Initial contact/receiving demand 2) Negotiation; 3) Execution plan; 4) Execution; 5) Evaluation analysis; 6) Presenting to Certification Board; 7) Delivery to client; and 8) Process finalization. Figure 8 demonstrates the IDEF0 as it opens from A0 into A1.

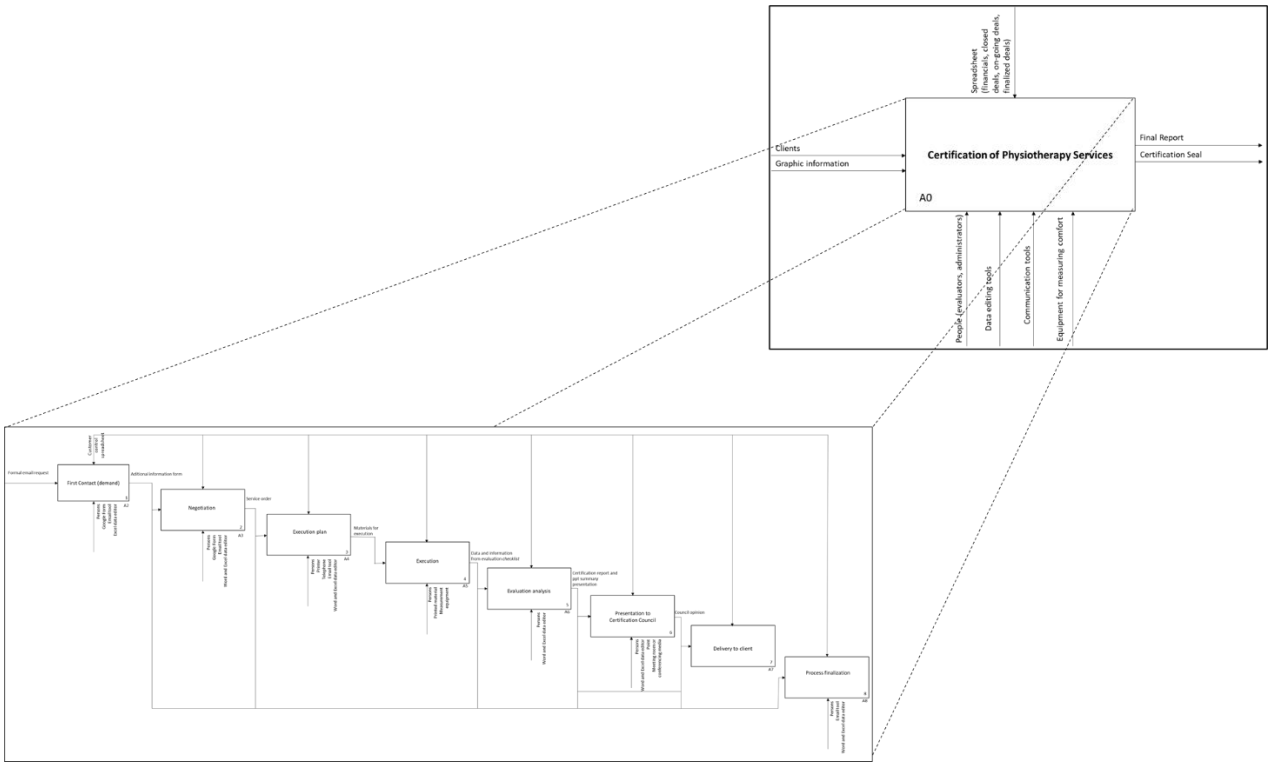

Figure 8 - IDEF0 Opening A0 into A1

Source: Authors (2017)

Each of the identified steps in box A1, which demonstrates a general scope of steps to be followed, generates a new box to describe the activities inherent to it.

Step	1 (A1)	2 (A1)	3 (A1)	4 (A1)	5 (A1)	7 (A1)	8 (A1)
Opening	A2	A3	A4	A5	A6	A7	A8

Chart 4 – Opening process

Source: Authors (2017)

Step 1 (A1) – Initial contact or demand is composed of 3 tasks: check email, feed controls spreadsheet, and send form requesting more information from the client. Figure 9 presents the activities diagram and Figure 10 shows the opening process in layers.

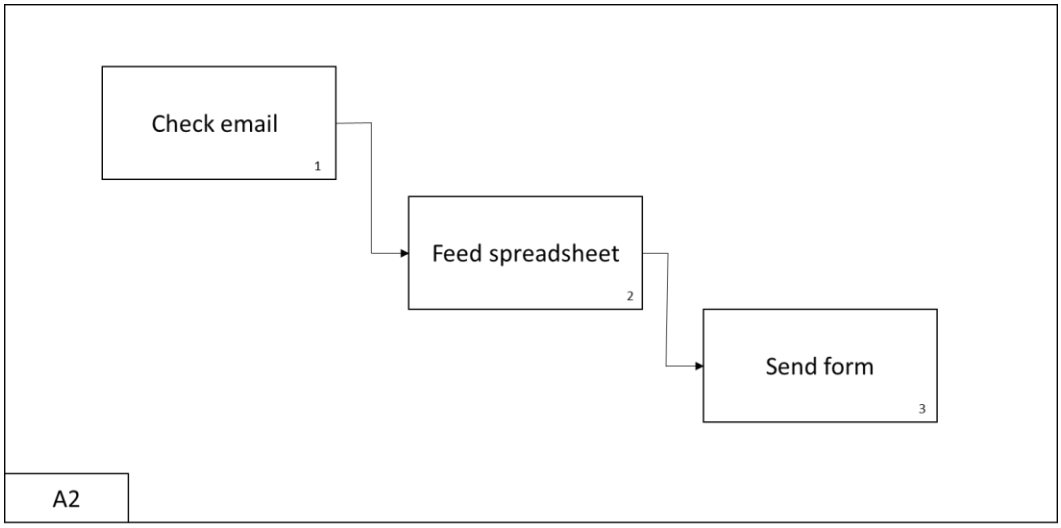

Figure 9 - Diagram of box A2 activities

Source: Authors (2017)

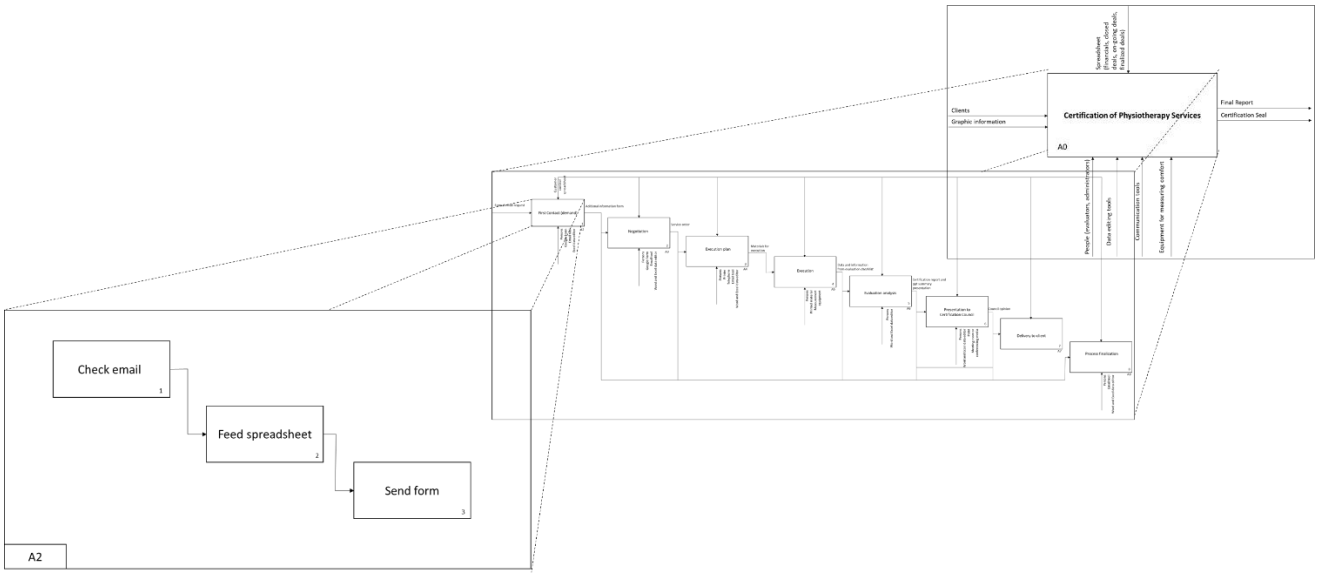

Figure 10 – Opening layers A0, A1 and A2

Source: Authors (2017)

The Negotiation 2 (A1) step is subdivided into 6 tasks shown in box A3, which are: verify form information from prior step, analyze what is needed to execute the job, contact the client for financial negotiations and contract details, develop and send contract, issue and send invoices to client, and produce work order so the next steps may development (Figure 11).

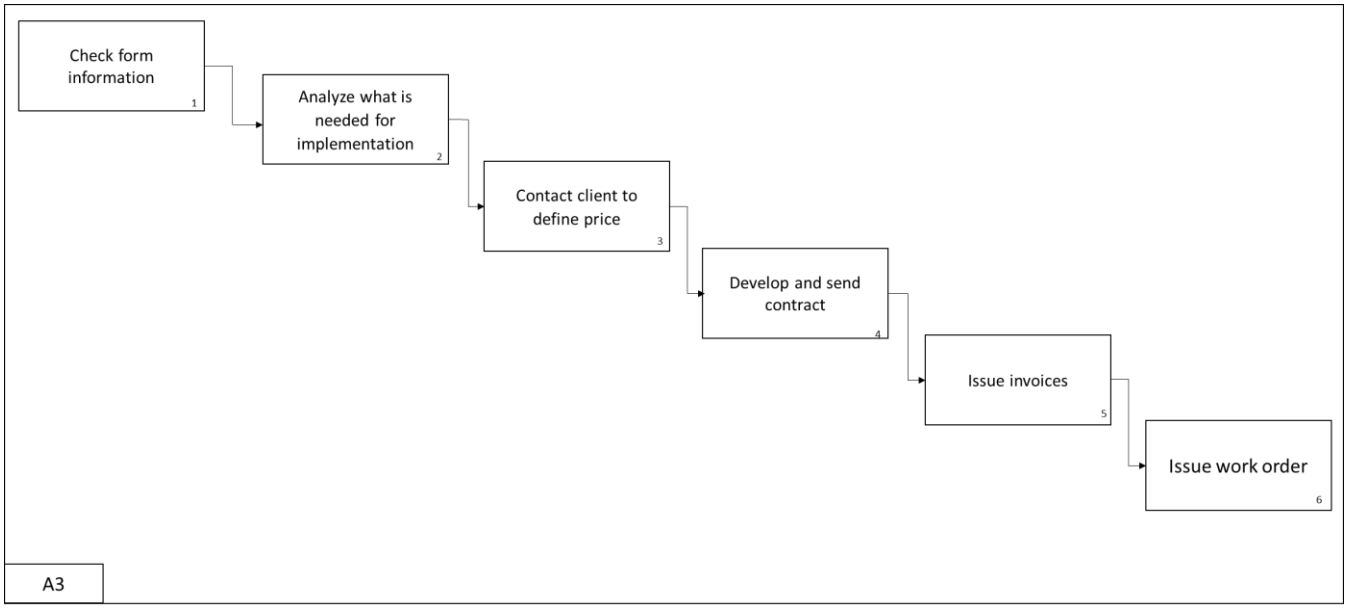

Figure 11 – Box A3 tasks for Negotiation step

Source: Authors (2017)

Box A4 describes activities related to the Execution Plan step composed of six tasks, where task two will open into box A4.1 to describe 5 activities. Figure 12 shows the opening of box A4, Figure 13 shows the opening of box A4.1, and Figure 15 shows the layered view that the model IDEF0 affords.

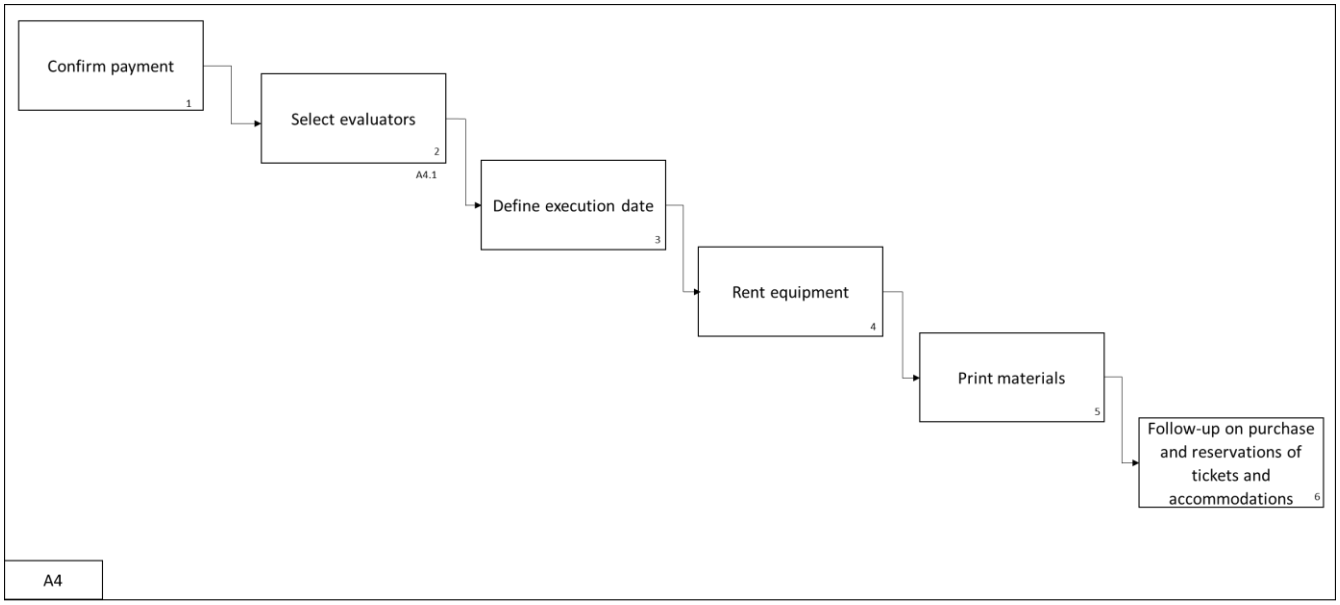

Figure 12 – Opening A4 related to the Execution Plan step

Source: Authors (2017)

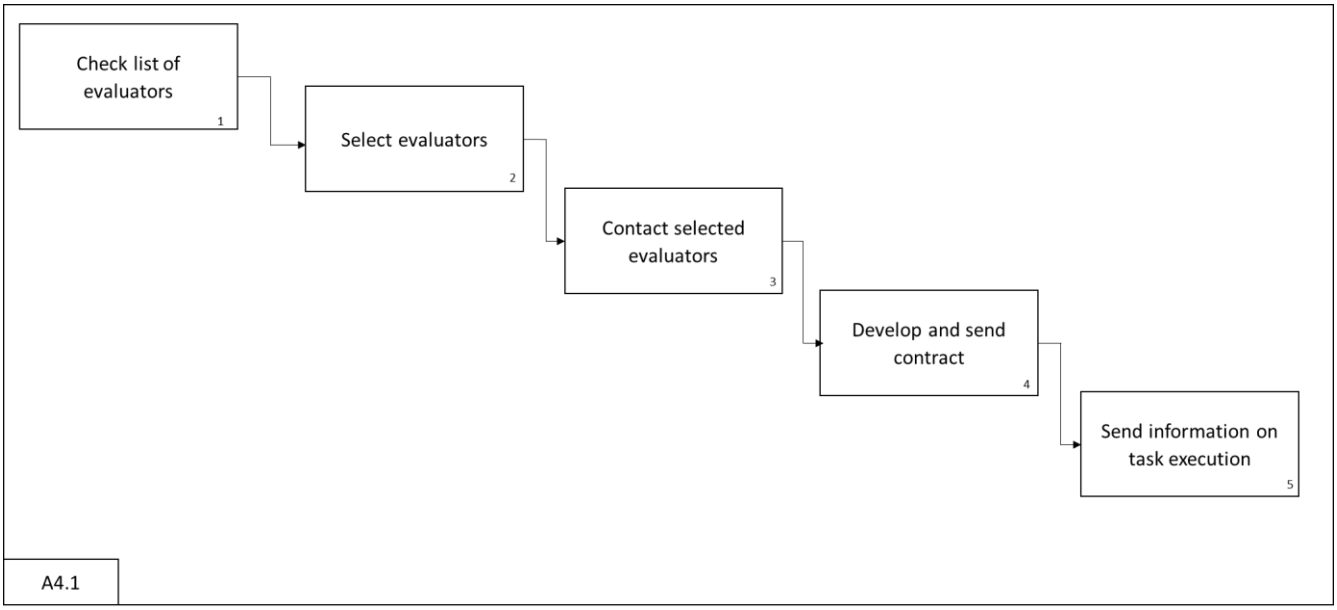

Figure 13 - Opening A4.1 related to the activity of Selecting Evaluators

Source: Authors (2017)

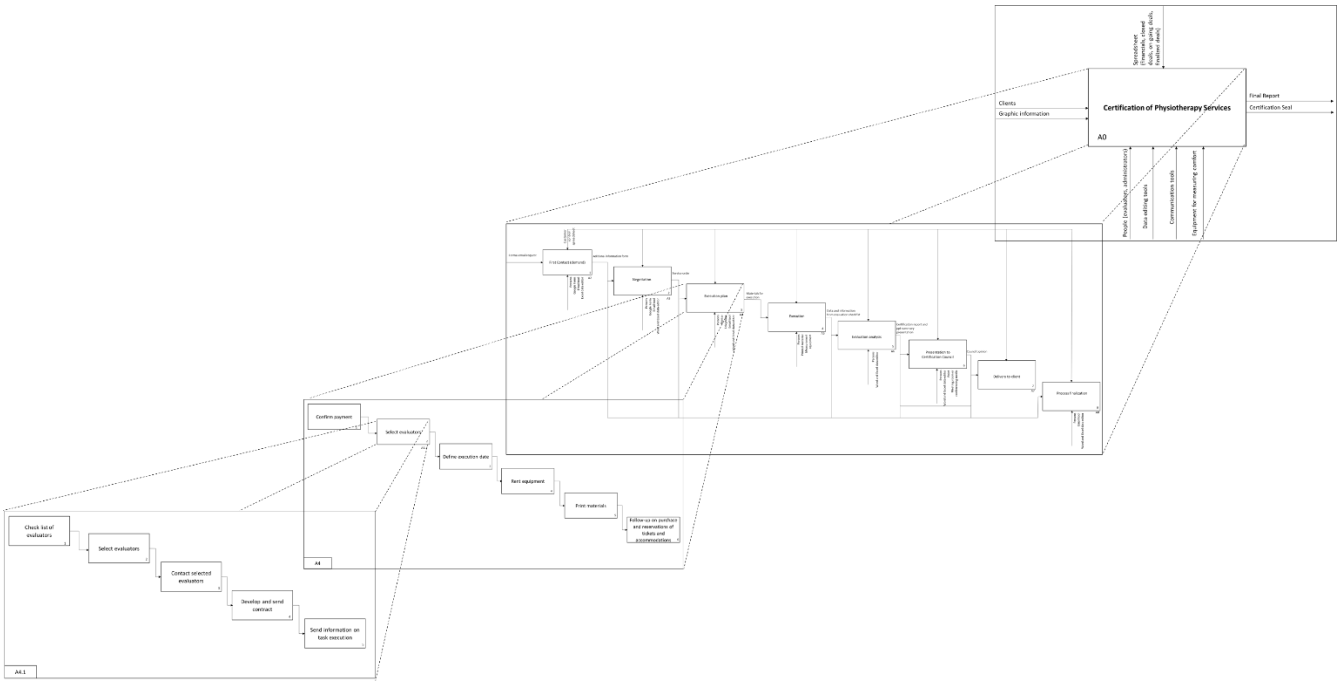

Figure 14 - Layered view of model IDEF0 - A0, A1, A4, A4.1.

Source: Authors (2017)

Figures 15, 16 and 17 show the opening of boxes A5 developing from step 4 (A1) Performance, box A6 developing from step 5 (A1) Evaluation analysis, and box A7 developing from step 7(A1) Delivery to client, respectively. A5 is composed of three tasks, A6 of 4 tasks, and A7 has 6 tasks.

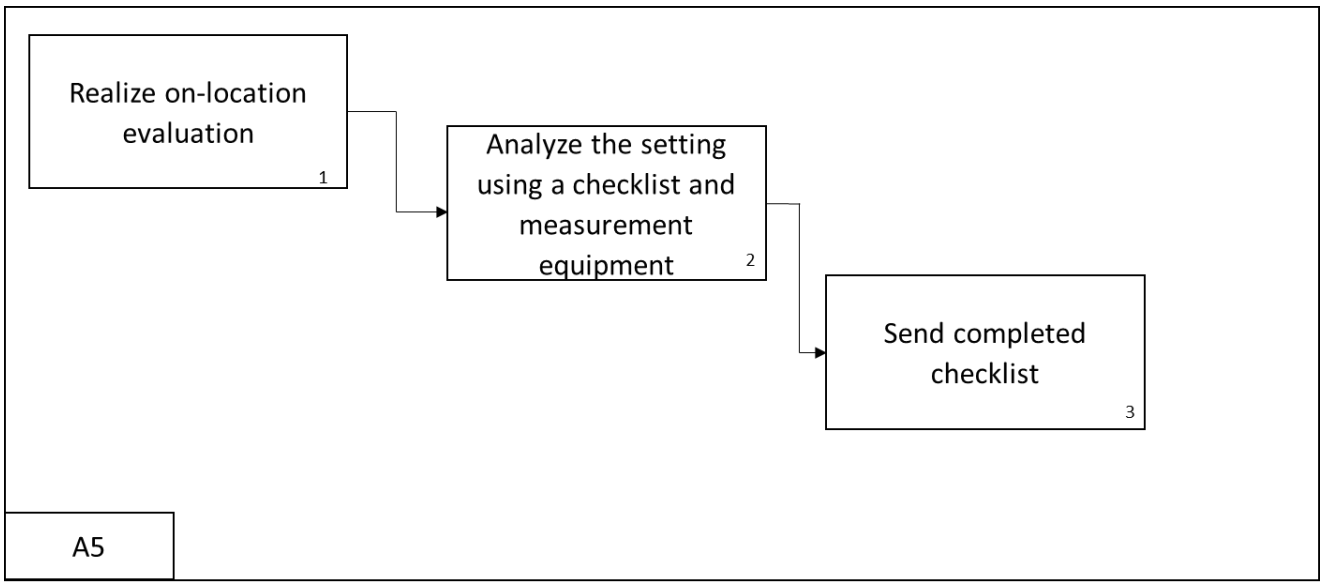

Figure 15 - Box A5 refers to step 4 (A1) - Execution

Source: Authors (2017)

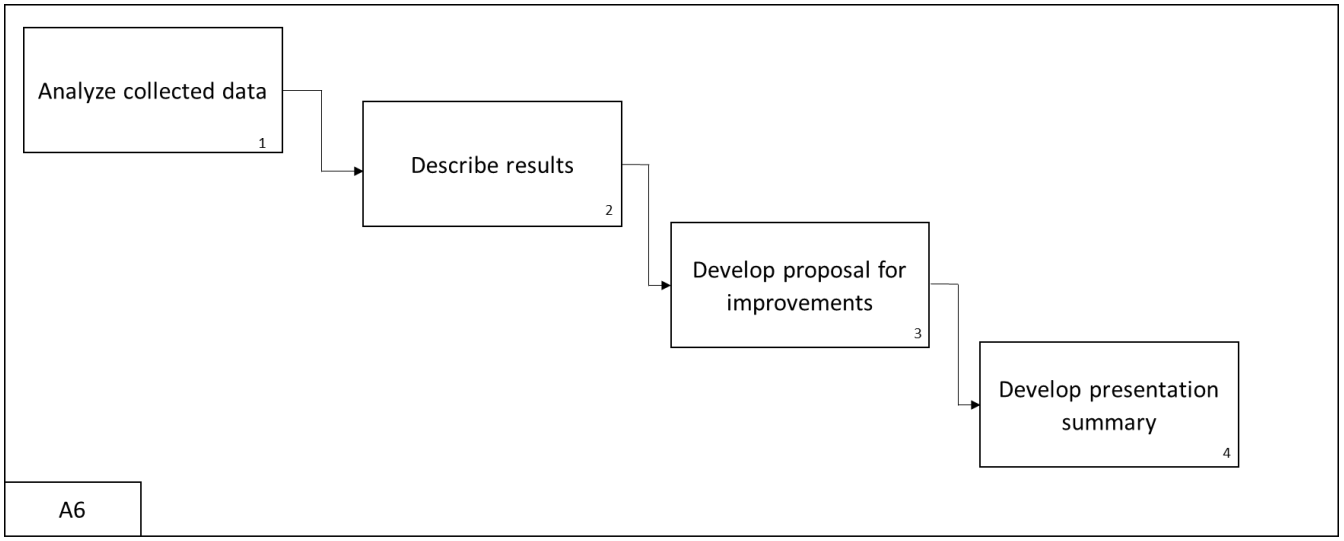

Figure 16 - Box A6 refers to step 5 (A1) - Evaluation analysis

Source: Authors (2017)

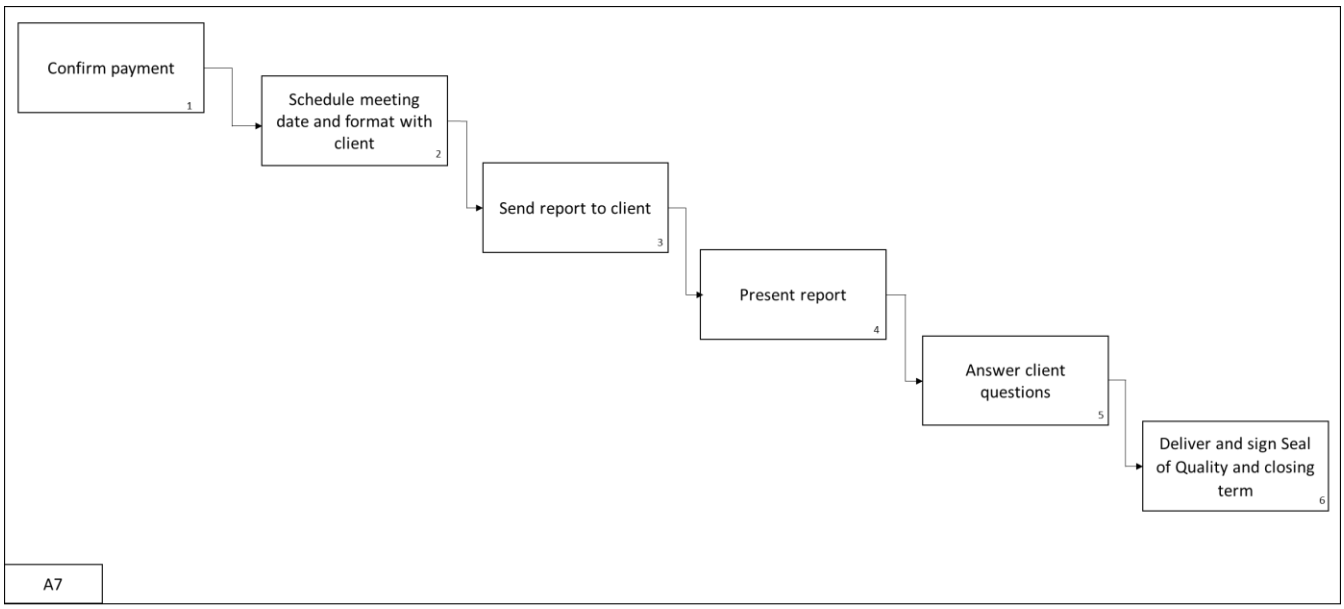

Figure 17 - Box A7 refers to step 7 (A1) Delivery to client

Source: Authors (2017)

Finally, box A8 refers to step 8 (A1) Process finalization, comprised of 4 activities. The last of these produces the output of this phase of the process "Final Report of process" (Figure 18).

However, due to limitations in this research, the relation between this process and other processes of the organization, such as marketing and after-sales, were not presented through graphics.

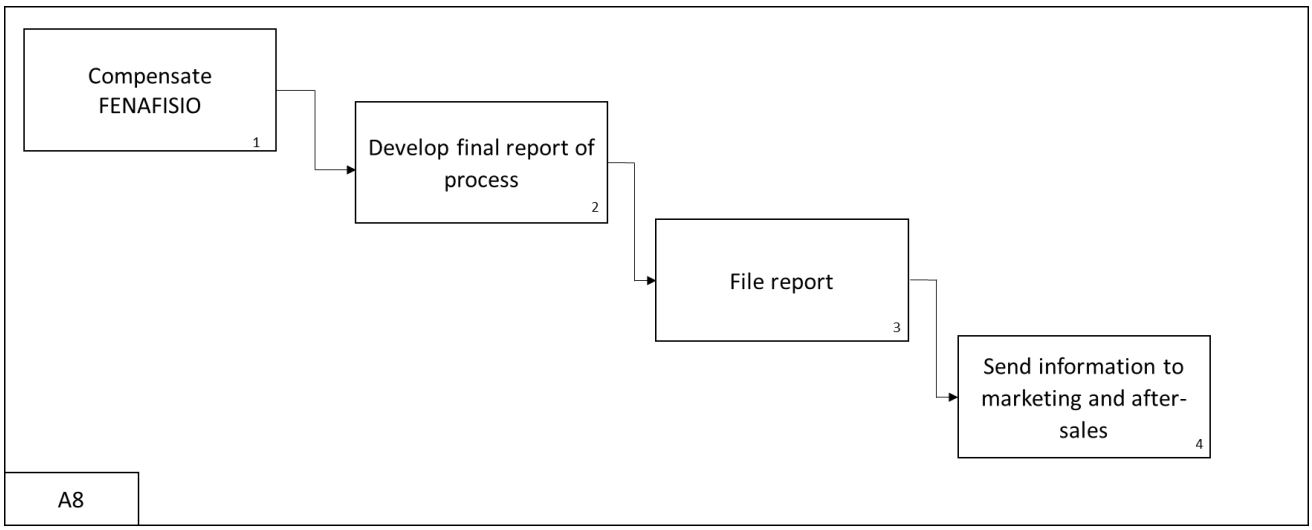

Figure 18 - Box A8 refers to step 8 (A1) Process finalization

Source: Authors (2017)

It is noteworthy to mention that this design represents the current configuration of the certification process of Physiotherapy services. Therefore, an analysis of what has been described is advised to identify further obstacles or existing positive points that may still be improved.

5. Final considerations

Withing the scenario of health care provider services, of which physiotherapy services are a part, the discussion about cost, quality, access to information, safety and guarantee of services provided to users becomes a strategic factor for organization. Implementing quality programs followed by certification programs proves to be of great importance, considering that physiotherapists do not graduate with the necessary training for management.

Process modeling provides an ample view with a broader understanding of the flow of documents and information between parts. Therefore, modeling makes it possible to identify obstacles, to make the process more efficient, and to have greater command of information to relay it to others.

Using the IDEF0 method for modeling processes renders a detailed view of subprocesses and activities that it comprises, helping to develop an organizational systemic view. Another positive point of using the IDEF0 method is that it allows for detailing the inputs, outputs, controls, and mechanisms that are necessary for realizing the process as a whole and in detailed steps of each related activity.

6. Acknowledgement

The present study was realized with the support of Federal University of Santa Catarina, Graduation Program in Engineering and Knowledge Management and Coordination for the Improvement of Higher Education Personnel - Brazil (CAPES) – Financing code 001.

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To Establish the Effects of Principals' Support to Teachers Through Mathematics Seminars/Workshop on Student' Performance in Mathematics in Kcse Examination in Meru County, Kenya.

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ABSTRACT

Performance in Mathematics in Meru County, Kenya from 2012 to 2016 has consistently been deteriorating. The purpose of this study was an evaluation of how the administrative strategies designed by the principals affected students' performance in the Kenya Certificate of Secondary Education (KCSE) in Meru County. Objectives that directed the study were to evaluate the various attributes on student performance in KCSE examination in Meru County. The objective was to evaluate principal's support to teachers through Mathematics seminars/workshops and student's performance in Mathematics. This study used ex post facto design. The research instrument was Mathematics teachers' questionnaire, KCSE document analysis for five years in Meru County and Principal's interview guide. The target population was 299 principals and 836 Mathematics teachers in the County. This study used stratified random sampling with proportional allocation. The sample size was 30% of the total target population translating to 92 principals and 251 Mathematics teachers. Validity was ensured by piloting the instrument. Reliability was ensured by using split half technique. The findings revealed that principals were not sponsoring Mathematics teachers to attend workshops and seminars.. The principals cited a lack of resources and budgetary allocation to the low number of Mathematics teachers attending seminars and workshops. The findings of the study were expected to be useful to the Ministry of Education, teachers and students as well as other stakeholders in the education sector.

Keywords: Mathematics**;** KCSE**;** performance; principals; administrative strategies; evaluation;

Background to the Study

To improve the performance of a school, it is paramount that the principals exercise leadership and acknowledge the fact that the direction of the school is a vision shared by all the stakeholders and ways to make the schools successful are well managed (Malkus, 2010). This therefore means that ensuring the necessary elements to improve students' performance are availed, are working effectively and are geared towards success of students as one of the key roles of the principal (Hill, 2006). With that, the responsibility of overviewing school systems, its processes and even resources and how all these combine to create the purposed learning outcomes for students is conducted by the principal as the chief architect of the school.

For achieving in academics, clearly defined goals are set by effective school principals. This means they avail resources and gear operations towards the set goals, provision of the timetable for teaching and routinely check and observe class instructions and even lesson plans. To check the attainment of instructional goals, they monitor progress of students continuously. This will mean they will report back on how the students perform, ensure discipline among students, ensure excellent student performance reinforced, motivate the teachers and capacity build them thus quality teaching-learning processes (Anderson & Nichols, 2007).

To improve student achievement in Mathematics, the teachers and the school administration have to perform evolving instructional administrative roles by applying practitioner-based effective teaching and learning strategies. This means that in order to increase on helping students get it better in Mathematics, one has to understand and select well the different teaching strategies combined, (Mohanty, 2005). The author, Mohanty 2005 continues to add that in schools where multiple changes in learning and activities that affect the daily living of students have shown to have the highest possibility of improving student learning. Such strategies may include introducing training for teachers, use of the learning cycle approach; use of computer simulations; organizing workshops and seminars for Mathematics teachers, organizing remedial classes for week students, encouraging students to conduct discussions and inviting specialists to talk to students on how to enhance academic performance in Mathematics.

According to Campbell and Malkus (2010), inviting Mathematics specialists may have impacts positively on what the students achieve as time progresses. Mathematics seminars and workshops are among strategies used in teacher's professional development (Garet, 2008). There are different studies to state that professional development affect how the students achieve. Scholars Garet 2008 and Wilson 2009 in their experimental study to examine features of high quality professional development found that the increase in the teacher's knowledge increased the desired practices in the classrooms but this did not mean improvement in student outcomes nor any sustainable changes.

Good performance in students is triggered by availing adequate teaching/learning resources which promote the schools' effectiveness. These are both human and non-human that affect the entire students' performance. Gifted and talented students embrace competitions as echoed by Malkus 2010; Davidson & Riley 2007 and the Ministry of Education (2004) add that competitions form a part of the required continuum of different opportunities. Use of small groups in class to perform different tasks presents positive impact on students learning as evidenced within the Mathematics education. Karnes (2003), made a comparison on how students achieve in Mathematics using small groups and using the whole-class

setting. Olembo, Wanga and Karangu (1992) argue that schools that perform poorly spend limited resources on the purchase of teaching and learning resources. UNESCO (2000) annual report posits that Excellency in academic pursuit is synonymous with mobilization of resources by school managers. A study by Ayot (2002) in Maseno Division showed that in availability of textbooks in learning institutions resulted in poor performance.

It's a global concern how students perform in Mathematics as evidenced in different studies. There is a study in the USA done by American Institute for Research (AIR) to find out how Mathematics perform on 4th and 8th grade students in the USA comparing it with the same graders across the world done by National Assessment of Education progress (NAEP) that the Mathematics students' progress of grade 4, 8 and 12. In their findings, Grade four pupils performed below the average mark from 1996-2007 consistently. African countries such as, Egypt, Tunisia, Morocco, Botswana, Ghana and South Africa participated in The International Trends in Mathematics and Science Study (TIMSS) in 2003. Comparison with TIMSS, 1999 indicated that there was no significant difference in Mathematics scores in this period (TIMSS, 2003). The Mathematics performance was poor between 1999 and 2003.

A report by National Education Commission of Tanzania (NECTA), (2013) presented that performance in Mathematics has been going down. This was similarly shown in the nation Form Four examinations of 2014 where the subject performed poorly compared to other subjects (NECTA, 2014). Programs in Education produce qualified teachers of Mathematics for secondary Schools. However, the general performance in Mathematics among secondary schools' students has been poor for many years Kenya National Examination Council (KNEC, 2006). This has the amplifying effect that Kenya may not achieve goal of industrialization as envisaged in the Vision 2030.

One of the greatest challenges faced by the Kenya education community as seen in the Global Literacy Project of 2008 is the continued downward trend in the performance of Mathematics in secondary schools despite the efforts of Kenyan government prioritizing Mathematics achievement and declaring it in her National Development Plan (2008). Some of the contributors of this poor Mathematics performance in Kenya in secondary schools include poor quality of teaching, the classroom environment being harsh and unfriendly, students lost interest and their negative attitudes and also poor management and administrative strategies. (Eshiwani, 1985; Marete, 2008).

Consortium on Strengthening Mathematics and Science Education (SMASE) of (2009) labeled criticism against teachers for the declining standards in Mathematics in the country. This poor performance is in both Kenya Certificate of Primary Education (KCPE) and Kenya Certificate of Secondary Education (KCSE). However, findings from a study in Murang'a County by Mwagiru (2014) on implementation of SMASE showed that adequate learning and teaching resources had not been availed by head teachers for use in science and Mathematics teaching to ensure implementation of SMASE. She also observed that Mathematics and science teacher is overloaded with high number of pupils per class, more than one subject to teach and heavy workload of lessons to cover per week killing their motivation to implement SMASE INSET. Marete (2012) also concurs, that SMASE approach of teaching and learning science and Mathematics has been partially achieved and implemented. He adds that the SMASE approach was encountering several challenges which were hindering full implementation. There has been great concern over the declining performance in Mathematics which has persisted in the last several years and Meru

County is not an exception. Therefore, this study is expected to address the poor performance in Mathematics in Meru County.

An analysis of the county's Mathematics results from the years 2008 to 2015 shows that performance in Mathematics has been below average of 50% (KNEC, 2015). While as other Counties in the country have consistently performed well in the subject, there is strong reason to believe that there is a problem worth researching on in Meru County. According to UNESCO (2015), the school principals being the people responsible for schools' performance are expected to come up with strategies that will enable their schools to boost performance in Mathematics. This study was set to establish the effects of principals' administrative strategies on Mathematics performance in KCSE among students in Meru County, Kenya.

Statement of the Problem

Up to the secondary level of education in Kenya, Mathematics is a core subject which means all the students have to take it up as one of their study subjects. This is because Mathematics forms the basis of other career fields including engineering, commerce, agriculture, medicine, architecture among others.

Despite the government of Kenya providing free secondary funds and prioritizing Mathematics. Mathematics performance at the secondary school level has continued to decline for the last five years in Meru County, from 2012 to 2016. Mathematics scores have been below average (2.8), which is averaged from the mean obtained between 2012 and 2016, an indication of grade D plain on average. However, in neighboring counties of Tharaka-Nithi and Embu had a mean of 4.5 within the same period, which are grade D+ and 4.91 which is grade C- respectively.

Although several studies have been conducted on the contribution of administrative role of school principals on student performance, there is limited information on evaluation of principals' administrative strategies on student performance in Mathematics and especially in Meru County.

Purpose of the Study

Was an evaluation of effects of principals' administrative strategies on students' performance in Mathematics in Kenya certificate of secondary education in Meru County, Kenya.

Conceptual Framework

Conceptual frame work showing how the variables in the study interrelate i.e the independent, intervening and dependent variables in the study

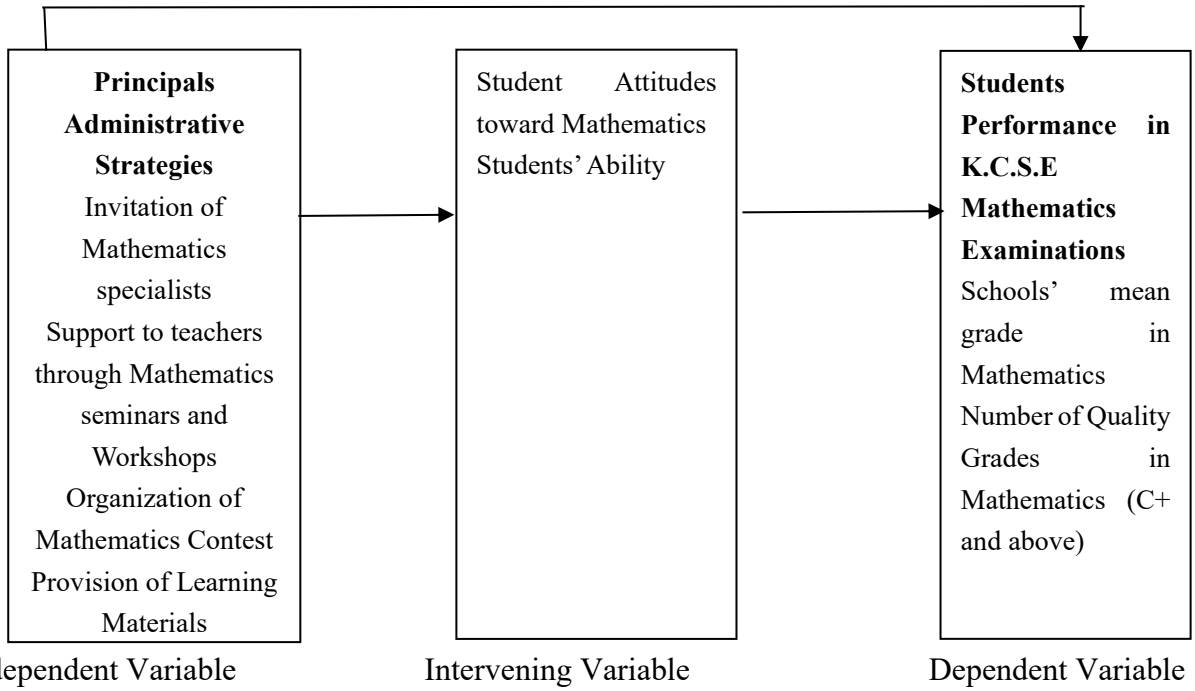


Figure 2.1: Conceptual Framework on strategies used by principals and student's Mathematical performance.

The researcher's hypothesis was that there existed a relationship between principals' administrative strategies and the students' performance in Mathematics in KCSE examination. However, other variables such as the attitudes of learners towards Mathematics were also likely to affect their performance in KCSE examinations.

The researcher's assumption was that the students' attitudes towards Mathematics as a subject and their ability have no significant effects on the relationship between principals' administrative strategies and students' performance in Mathematics in KCSE examination since those students had performed in their KCPE in order to be admitted to those secondary schools. To control student attitude towards Mathematics, the researcher divided the students into two groups. The experimental and control group. The researcher administered the test to the two groups and manipulated the results of the experimental group. If the results were 40% and below, the researcher rejected the null hypothesis that there was no significant relationship between principals' administrative strategies and students' performance in Mathematics in KCSE examination. Workshops and seminars attended by Mathematics teachers would help them to sharpen their skills and competencies and therefore support from the school principals for those teachers who went for in service courses and workshops would ultimately affect academic performance of the subject in examinations.

RESEARCH METHODOLOGY

Research Design

This study used ex-post facto design because the variables under investigation had already occurred (Creswell, 2013). Therefore, in this study the researcher was not able to manipulate the independent

variables in order to get their impact on dependent variables because their effect had already occurred. Additionally, in this case there were no two groups, the control group and the experimental group.

Target Population

This study targeted a population of 299 principals and 836 Mathematics teachers in secondary schools in Meru County. In this study, a classification of the schools in terms of gender mixed schools (211), Girls' schools (54) and Boys' schools (34) was done.

Sample Size and Sampling Procedures

On determining the sample size, Mugenda & Mugenda (2003) state that depending on time and resources available, a 10% sample can be used for a large population is studied more than 1000 while for smaller populations, less than 100, 30% sample be used. This study therefore used 30% of 299 principals and 836 Mathematics teachers translating to 92 and 251 sample size, respectively. This will ensure that the number of schools per category are a good representative of the population and hence increase the precision (Creswell, 2013). For selecting schools in the different categories, stratified random sampling with proportional allocation was employed. The method will ensure that the characteristics of the three sub-groups are represented. In each category, the researcher employed simple random sampling to determine the specific school that was visited. The same procedure applied to identification of respondents.

Table 3.1: Number of Schools Visited per each Category

Mixed Schools	Girls' Schools	Boys Schools	Total Number
64	17	11	92

Research Instruments

The research instruments that aided in conducting this study were:

i. Mathematics Teachers' questionnaire
ii. Document analysis
iii. Principal's Interview guide

All the instruments were developed by the researcher.

Piloting Instruments

To ascertain the validity and reliability of the data collection questionnaires, pilot survey was conducted. Pilot test assisted in establishing any flaws, weaknesses and limitations seen in the interview design that were there and gave room for the adjustments to be made before the actual study implementation (Kvale, 2008).

The pilot testing of the data collection tools not only ensured the questions flow or make sense but also to improve the functioning of the tool in general (Creswell, 2003). A selection of 10 schools was chosen to take part in the pilot study for this study, three schools from each of school category. The findings of the piloting of the research instruments was used to fine tune and enhance the efficacy of data collection tools to collect adequate and sufficient data to enable the study to achieve the research objectives exhaustively.

Validity of Research Instruments

The degree to which the results analyzed from the data collected actually represent the phenomenon being investigated is called validity, (Orodho, 2009). It describes whether an instrument captures the intended information it was designed for. Expert judgement and review was used to enhance content validity of the data collection tools (Kumar, 2009). The instruments were prepared with close consultation from the supervisors by the researcher order to ensure that the questionnaires cover all the areas under investigation in all the sections. To ensure the validity of the research instrument the researcher ensured that each specific objective, questions of study and objectives were addressed by items in the questionnaire. Expert judgment was used to enable the researcher identify weaknesses of the instruments and make appropriate adjustments. Two supervisors from Maasai Mara University were asked to give their advice on the questionnaire. After getting the advice views, the researcher edited the instruments accordingly.

The pilot study done to pre-test the instrument and cater for instrument validity. The instruments were administered to the respondents from six public secondary schools that did not participate in the main study giving a total of six respondents. The instruments were then being modified based on the results of the pilot test. Further, the findings from each of the three tools for collection were triangulated to strengthen the validity of the research findings and the efficacy of the tools in the data collection.

Reliability of the Instruments

Reliability refers to the consistency of results on replication of the same study using the same instrument (Bryman, 2012). It is generally understood to be the extent to which a measure is stable or consistent and produces similar result when administered repeatedly (Sushil & Verma, 2010). This study used split-half technique. Creswell (2013) asserts that split-half technique involves dividing research instruments into two, using a scientific sampling procedures. Systematic random method of splitting is advocated by Drost (2011) as the most realistic in ensuring splitting of research instruments do not lead to biased results. The researcher further underscores the need to ensure that before systematic splitting is performed, instruments must not have been arranged in a certain systematic manner.

In this study, the researcher split the instruments into half using systematic method, where two groups were created and two instruments were picked at a time and separated for each group. This continued until all of them were split. After this procedure, data was entered into SPSS and a correlation coefficient obtained for the two groups. A coefficient of 0.7 and above is considered reliable (Creswell, 2013).

Data Collection Procedures

The researcher was first to get a clearance letter to carry out research from the Board of Postgraduate Studies of Maasai Mara University. The researcher then sought permit to conduct research from NACOSTI. The researcher then contacted the County Director of Education for permission to do the research in the County.

The researcher made a visit to the sampled schools. The ethical clearance letter was presented that allows the study to be conducted from the ministry of education and a letter of introduction from the university as well. After the permission was granted to conduct the study, the researcher asked the principal permission to be allowed to give the questionnaire to Mathematics Teachers to fill it. The researcher then requested the principal to give results for the school for the last five years from 2012 to 2016.

The researcher recorded in the document analysis quality of grades C+ and above the grade, which the student ought to obtain in order to qualify for a course of study in the university. These grades were used to examine trends in Mathematics performance. Then the researcher administered to the principal interview guides where the principal was expected to answer questions about administrative strategies he or she had put in place to improve performance in Mathematics in the school. The researcher collected the research instruments after one day.

Data Analysis

The process where order, structure and meaning is given and brought to the information collected is known as data analysis (Mugenda & Mugenda, 2003). Chi-square was used to test the Hypotheses to evaluate the relationship between independent and dependent variables. The confidence level of hypotheses testing was 0.05. Once the data was collected, it was post-coded and analyzed using the Statistical Package for Social Sciences (SPSS) with help of computer software. Quantitative data gathered from closed ended questions was summarized and organized into similar themes as per the research questions. It was analyzed using frequency distribution table's percentages. Quantitative data presentation was through tables, percentages and normal distribution tables.

To integrate qualitative data obtained from open ended questions into inferential data. Data was organized and the interpretation of information was done. The qualitative data was reported through narratives and statement of the respondents. For the study to find out the interaction between the invitation of Mathematics specialists by the principals and how the students perform in Mathematics in KCSE examination, Chi-square was used.

To establish the effects of relationship between principals' support to teachers through Mathematics seminars/ workshop and how the students' perform in Mathematics in KCSE examination, Chi- square was used. To establish the effects of relationship between principals' organization of Mathematics contests and students' performance in Mathematics in KCSE examination, Enova was used. To establish the effects of principals' provision of teaching and learning materials on students' performance in Mathematics in K.C.S.E in Meru County, Chi-square was used.

RESULTS AND DISCUSSIONS

Response Rate per Secondary Schools per Category

The researcher targeted a representative sample of 92 secondary schools comprising of 64 mixed schools, 17 girls schools and 11 boy's schools were issued with the interview guides. Out of these, the entire 92 principal's filled and returned the interview guides making a response rate of 100.0%. The researcher also targeted 251 Mathematics teachers who were issued with questionnaires. However, only 223 successfully filled and returned the questionnaires making a response rate of 88.8%. These response rates were deemed high and enough to analyze and draw conclusions.

KCSE Performance in Meru County from 2012 to 2016

The dependent variable in the study was the student's KCSE performance in Mathematics. In order to obtain the trends in Mathematics performance, the researcher obtained a 5-year data from each of the 92 schools where the principals were interviewed. The results were as displayed in Table 4.1. However, the N value differed in each year as there were some schools that did not have students to sit for the national examinations in the respective years. These were mainly mixed day schools which had been opened recently and just started sitting for KCSE examinations.

Table 4.1: KCSE Performance in Mathematics in Meru County

	N	Mean	Std. Deviation
KCSE_2012	83	4.332	1.981
KCSE_2013	83	4.469	2.079
KCSE_2014	86	4.415	1.946
KCSE_2015	89	4.637	2.108
KCSE_2016	92	3.756	2.380
Average	**83**	**4.322**	**2.099**

From the findings, it was observed that the overall mean average performance of students in the selected schools was 4.322, with a high standard deviation value of 2.099. The total score was based on a 12-point, with 12 being the highest score and 1 being the lowest. Therefore, it was discerned that on average, the average performance of the selected school was D+. The high standard deviation demonstrated the disparity between the schools with high Mathematics performance and those with the lowest performance.

For instance in 2013, the mean score was 4.469 with a high standard deviation of 2.08. It could also be observed that the Mathematics performance in KCSE dropped in 2014 (mean =4.415) and again in 2016 (mean =3.756). This showed that the performance of schools in Mathematics is generally low, but due to the high standard deviation, it is evident that the school performance is not uniform. Rather, some school seem to be performing well while the majority are performing poorly as seen in the low mean score values of less than five.

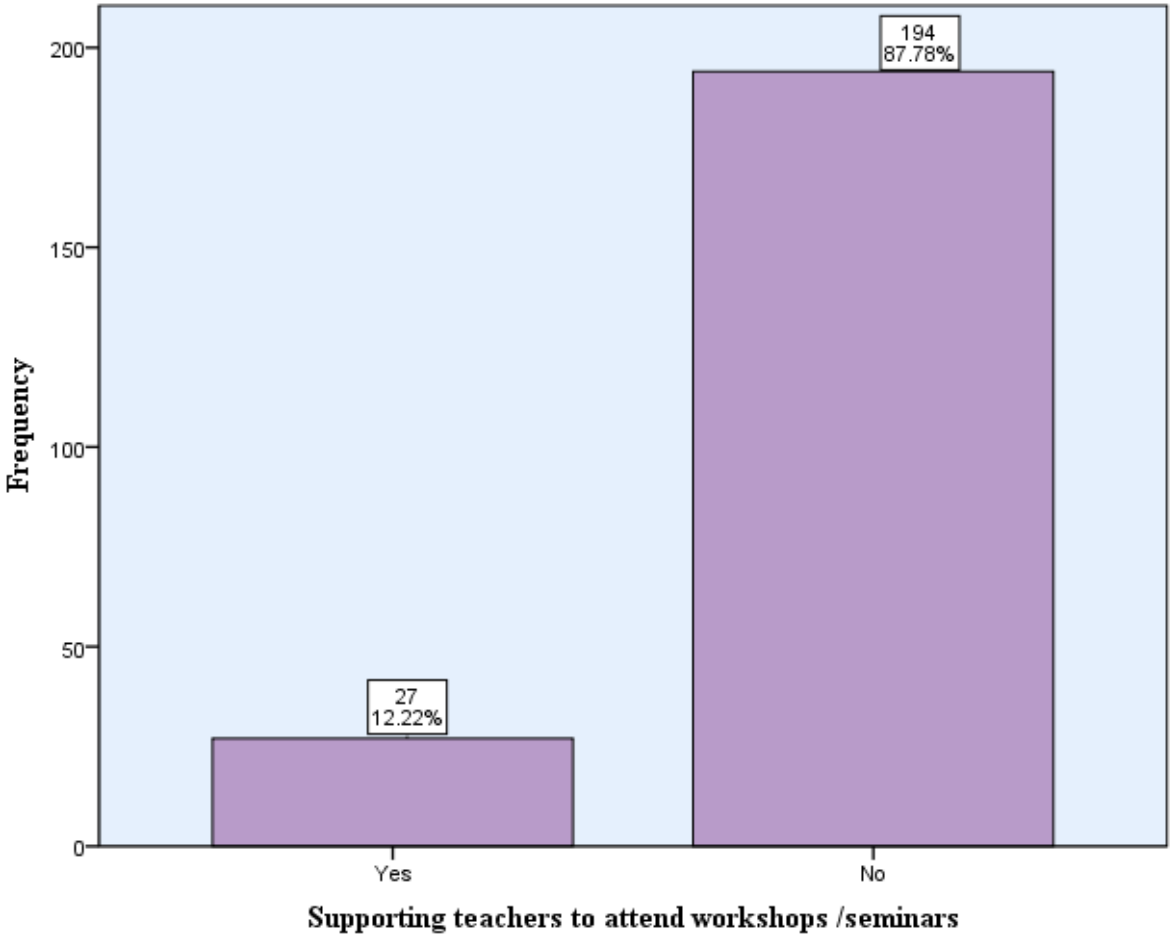
The table also shows that the performance has not been consistently improving, but rather, it increased between 2012 and 2014 before declining in 2014. In 2015 and 2016, a considerable decline in the performance can be seen. From these findings, it could be seen that there is no steady trend in the student's performance in Mathematics in KCSE. Rather, it was evident that the student's performance remain consistently poor in line with the national results which reveal a poor performance in Mathematics.

Principal's Support to Mathematics Teachers through Seminars and Workshops to Improve Performance in Mathematics

The second objective of the study sought to evaluate the effects of principals' support to Mathematics teachers through Mathematics seminars/workshop on student' performance in Mathematics in KCSE examination in Meru County. First, the researcher asked the Mathematics teachers to indicate whether their

principals supported them by sending them to seminars or workshops. Their responses are as displayed in the Figure 4.6.

Figure 4.6: Principals' support for teachers to attend workshops/seminars

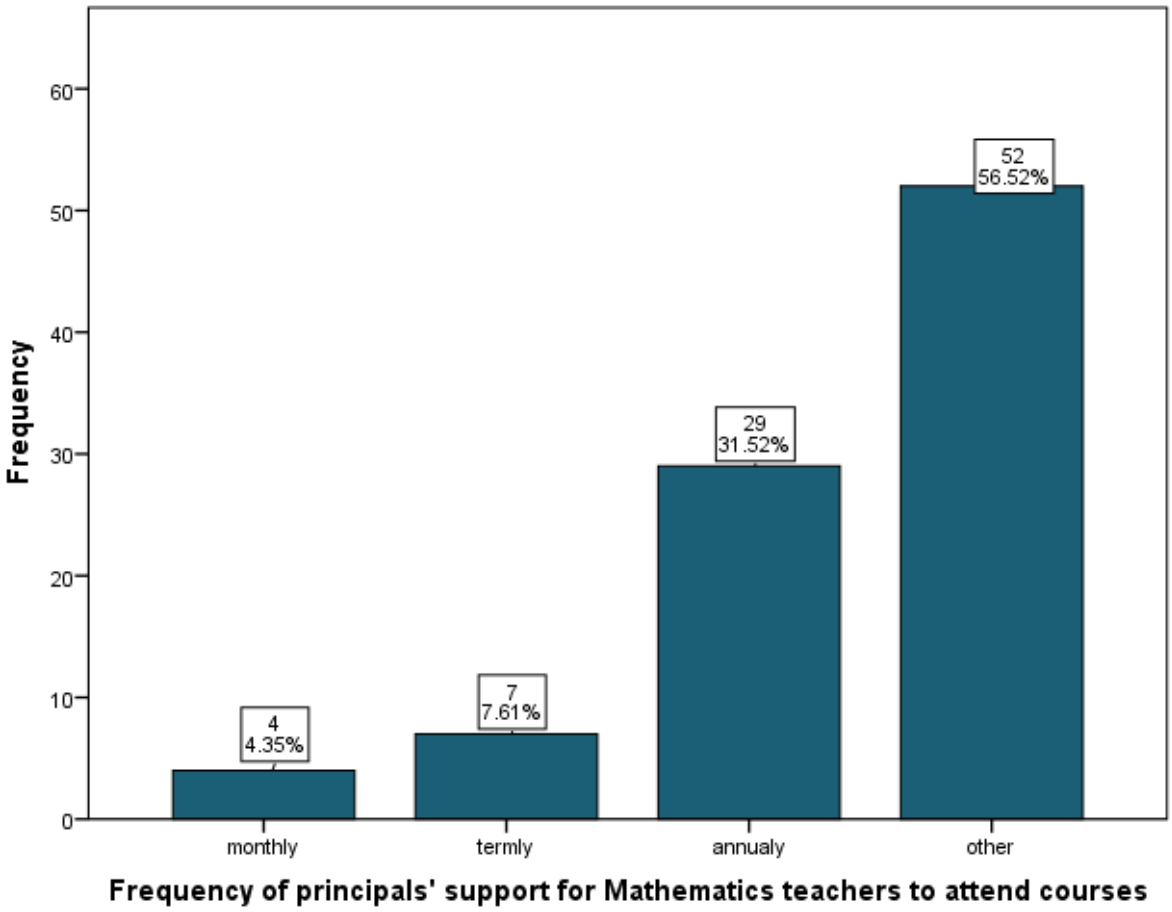


As indicated in the Figure 4.6, the majority of the Mathematics teachers 194 (87.78%) refuted the claim that their principals supported them to attend workshops or seminars with only a minority 27(12.22%) claimed their principals supported them to attend workshops.

From these findings, the researcher deduced that the majority of principals did not consider their Mathematics teacher's attendance of workshops and seminars as being an important aspect of improving performance of students in Mathematics. This was irrespective of the skills and integration of new instruction skills Mathematics teachers stand to gain from the seminars and workshops.

The principals were then asked to indicate how many courses they had supported their Mathematics teachers to attend in the last two years. Their results are as provided in the Figure 4.7.

Figure 4.7: Course Support by the principals' to their Mathematics teachers



It was seen that most of the principals 52 (56.52%) did not organize for their Mathematics teachers to attend professional development courses, while 29 (31.52%) supported their Mathematics teachers to attend courses annually, seven (7.61%) supported them once every term and 4 (4.35%) supported them once a month.

From these findings, the researcher deduced that in the majority of secondary schools in Meru County, little effort is placed on Mathematics teacher's development through course attendance. These findings go hand-in-hand with the Mathematics teacher's assertions in Figure 4.6 where the majority 194 (87.78%) asserted that their principals did not organize for them to attend workshops and seminars. The lack of continuous professional development through seminars, workshops and course attendance across the majority of schools could be linked to the continued dismal performance in Mathematics in Meru County. From the interview schedules, the majority of principals felt that the lack of resources was the major reason for their inability to organize courses to support their Mathematics teachers. One of the principals who did not support their Mathematics teachers to attend courses claimed:

> *"In my school, we lack resources and finances to send our Mathematics teachers out to seminars and workshops or even to professional development courses."*

Another principal claimed;

> *'I do understand the importance of Mathematics teacher's professional development through seminars and workshops, but strained finances really limited our ability to send our Mathematics*

teachers to seminars and workshops frequently. We do try from time to time, but I feel that we are not really doing enough to ensure that our Mathematics teachers are well-equipped to promote better performance in Mathematics.'

These responses from the principals revealed that financial obstacles limited schools performance in KCSE in Mathematics. Therefore, the government should look for ways for giving schools adequate finances.

With reference to the lack of professional development, the researcher asked the principals how they motivated their Mathematics teachers to improve performances. One of the principals claimed:

'I provide the Mathematics teachers with materials for CATS such as printers and printing papers.'

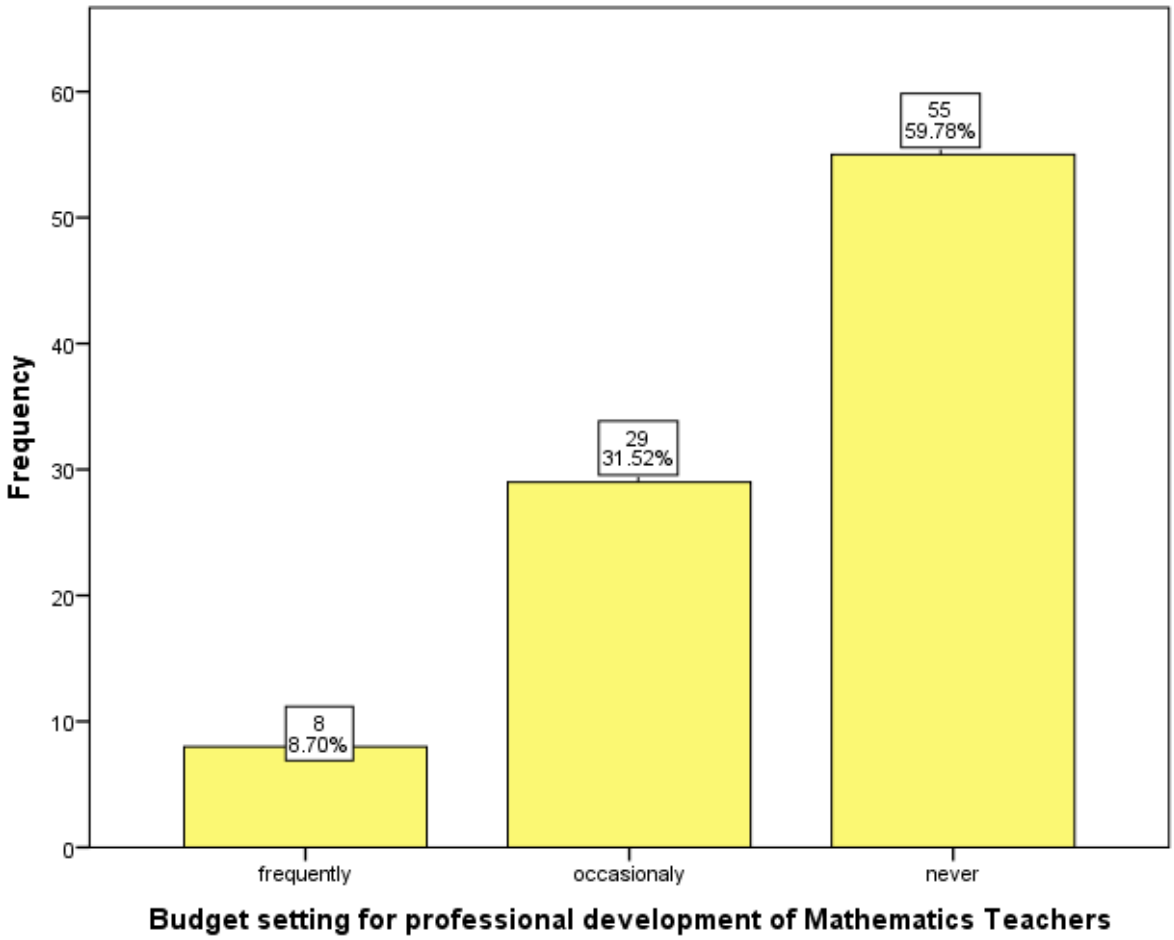
Another principal claimed,

'I allow my Mathematics teachers to attend workshops and seminars once a year, and then at the end of the years, I give outstanding Mathematics teachers a small 'bahasha' or small token to appreciate them. I also send them a congratulatory messages."

These statements by principals were evidences that some principals supported their Mathematics teachers to improve performance in Mathematics. It was found out that they gave them material resources, supported them to go to seminars and gave them individual recognition, which resulted to improved performance in Mathematics.

The researcher then went forth to ask the principals to indicate how often their schools allocated a budget for teacher's professional development. The principals' responses are as indicated in the Figure 4.8.

Figure 4.8: Budget allocations for professional development for Mathematics teachers



It was seen that the majority of principals/schools 55 (59.78%) never allocated a budget for Mathematics teacher's professional development, while 29 (31.52%) occasionally set a budget aside and a minority eight (8.70%) set a budget for Mathematics teacher's professional development frequently.

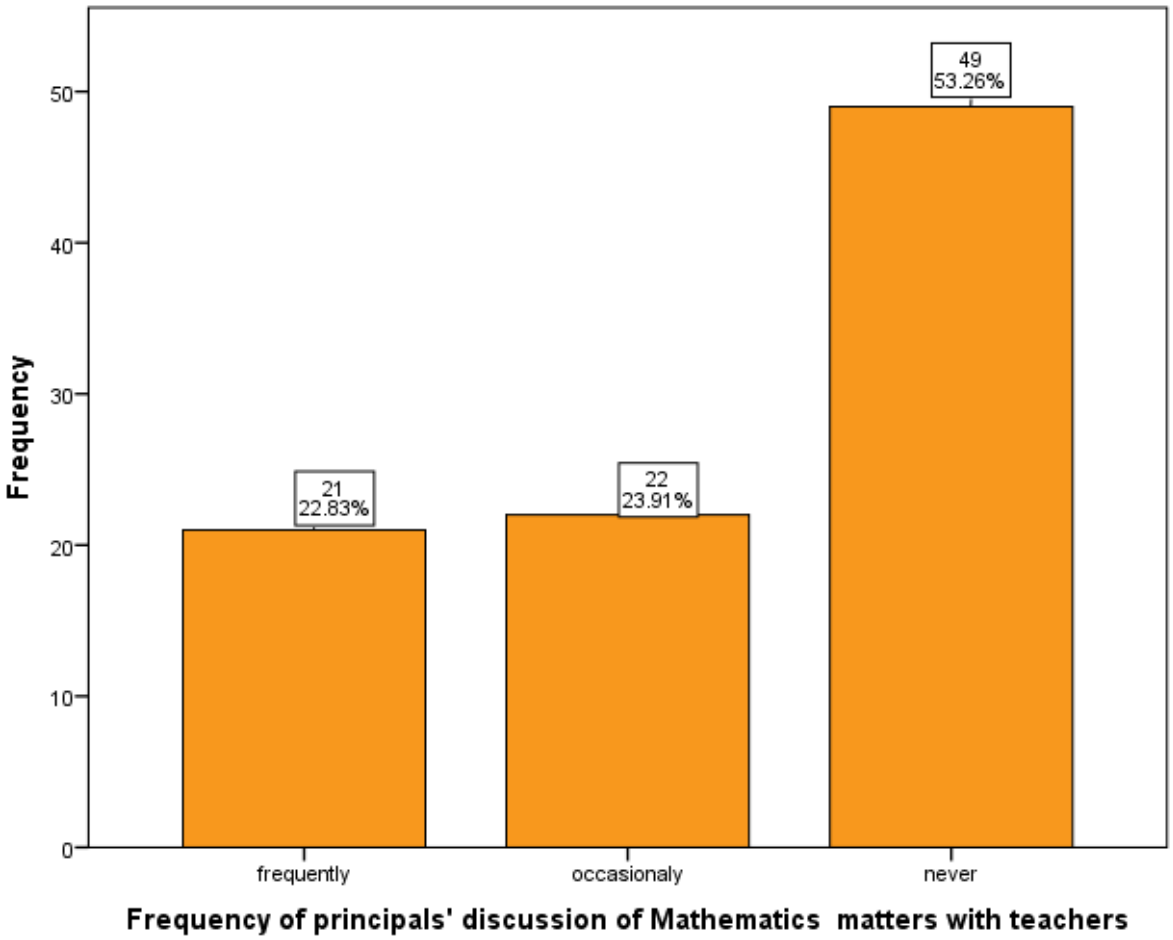
These findings showed that in majority of schools across Meru County, there was no budget set aside to ensure that Mathematics teachers engaged in professional development. This contributed to the declining students' performance in Mathematics as the teachers' knowledge and skills stagnated over the years as they lacked the engagement with peers and experts to initiate and share new ideas and instructional methods to improve students' performance.

These sentiments are expressed by the South Africa Department of Education (2008) which claims that professional development symbolized all the goings-on in teaching and learning with the aim of empowering the Mathematics teachers to accomplish their duties more competently and successfully towards achieving improved learner achievement.

It is concerned with enabling learners receive learning by providing Mathematics teachers with quality teaching skills and subject knowledge in order to enable them impart knowledge to the learners. Additionally, it was specified that teaching involves the experts to be well-informed of new developments, in order to be imaginative and passionate educators so that students could perform well.

The researcher also deemed it important to ask the principals how often they engage Mathematics teachers on discussions pertaining challenges and issues on teaching and learning Mathematics in their respective schools. The responses are as indicated in the Figure 4.9.

Figure 4.9: Discussion frequency to improve performance in Mathematics



The Figure 4.9 showed that most of the schools 49 (53.26%) never discussed matters that affected teaching and learning Mathematics with their Mathematics teachers, while 22 (23.91%) discussed them occasionally and 21 (22.83%) discussed them frequently.

From these findings, the researcher discerned that the majority of schools did not engage their Mathematics teachers to find out what challenges or issues they experience while teaching and learning Mathematics. Therefore, even when teachers were facing challenges, they lacked a platform with which to air their grievances or ask for support; this compromised the delivery of services and how students performed in Mathematics.

The researcher then sought to determine whether the allocation of a budget and discussion of issues and challenges had an association with the student's performance in KCSE. To achieve this, a chi-square test of independence was conducted at 95%confidence interval. The findings are as displayed in Table 4.6.

Table 4.6: Chi-Square- Principal's support and KCSE performance in Mathematics

Principal's support		KCSE PERFROMANCE				P=value
		N=92	Poor	Average	Good	
Budget allocation	Frequently	F	1	3	4	0.000
		%	1.09	3.26	4.35	
	Occasionally	F	12	16	1	
		%	13.04	17.39	1.09	
	Never	F	54	0	0	
		%	58.7	0	0	
Mathematics discussions	Frequently	F	8	9	5	0.000
		%	8.7	9.78	5.43	
	Occasionally	F	8	14	0	
		%	8.7	15.22	0	
	Never	F	48	0	0	
		%	52.17	0	0	

As the Table 4.6 shows, most of the schools that frequently allocated budgets for Mathematics teacher's professional development four (4.35%) had good performance while only one (1.09%) of poor performing schools allocated budgets frequently.

Similarly, the table shows that among the schools that occasionally set aside budgets for Mathematics teacher's professional development, the majority 16 (17.39%) were from average performing schools while all 54 (58.7%) of the schools that did not allocate budgets for Mathematics teacher's professional development performed poorly.

From these findings, it was seen that there is an association between budget allocation for Mathematics teacher's professional development and the school's performance in Mathematics. These findings are echoed by the chi-square results which showed that there is a statistically significant association between budget allocation for professional development and the school performance at p value ($p=0.000<0.05$).

These findings showed that schools that invested in their Mathematics teacher's professional development increased their students' performance while those that neglected to develop their Mathematics teachers professionally continued to perform dismally.

The above findings were supported by the claims by the Department of Education (2008) which stresses that schools need to have staff professional developmental programs in order to achieve endurance in professional development. Professional development should be understood by the principal who is the instructional leader as a tool designed to clarify learners' achievement. Developing the staff is therefore as a way to achieve better, have active and efficient school teaching and learning.

To have effective professional development, therefore, there should be a focus to improve instructional practices, where Mathematics teachers are provided with new knowledge and have methods to evaluate learning with the aim of improving students' learning (*Wei*, Darling-Hammond, Andree, Richardson and

Orphanos, 2009).

Additionally, Essien, Akpan and Obot (2016) also reported that there was a positive correlation between the principal's support of teacher's attendance of seminars, workshops and in-service training. According to the findings, it is evident that the developing teachers professionally was crucial for the performance of learners.

This may be due to the performance of learners being largely dependent on the quality of the teacher; therefore, when principals send teachers to in-service training, seminars and workshops, they are improving the quality of the teachers and the benefits are derived by the students when the teachers could effectively utilize the resources and the classroom environment to deliver content.

In this case, it was deduced that when the teacher's needs are met through their professional development, their competence increases. However, if the teacher's professional needs are not met, then the teacher will be dissatisfied making the teacher unstable and would not be productive. Therefore, in this case, the majority of the schools have been found to fail in allocating budgets to facilitate teacher's professional development.

Therefore, drawing from the assertions of Wei, Darling-Hammond, Andree, Richardson and Orphanos, (2009); Essien, Akpan and Obot (2016) it was evident that the poor performance of the school that did not set aside budgets to send teachers to workshops and seminars stems from the minimal expertise that teachers could get from attending professional development classes.

Additionally, as Essien, Akpan and Obot (2016) affirms, teachers whose professional needs are not met are often psychological unstable and therefore, unproductive. These teachers feel unappreciated and as such, may be dissatisfied and inadequately motivated resulting in poor delivery of subject content. Further, Kyalo, Chepketer, and Kyalo (2016) also reported that despite some schools having well qualified and well-trained teachers there are many instances where teachers require refresher courses to help improve their teaching performances.

As such, it was seen that the performance of students is still poor, more so in public schools. It is evident that the schools are not offering teachers the chance to refresh their skills and knowledge just as has been identified in the current study.

The Table 4.6 then shows that the schools that had good performance five (5.43%) held frequent discussions with their Mathematics teachers to discuss issues and challenges in teaching and learning Mathematics. Similarly, the majority of the schools that occasionally held discussions 14 (15.22%) recorded average performances while the majority of the poorly performing schools 48 (52.17%) never held discussions with Mathematics teachers to discuss issues affecting teaching and learning of Mathematics in their respective schools.

From these findings, it was evident that holding discussions with Mathematics teachers to highlight and discuss the issues facing Mathematics teachers and students in teaching and learning Mathematics had a significant effects on their performance evidenced by the p value of $0.000<0.05$, which was not statistically significant.

From these findings, it was seen that holding frequent discussions gives the Mathematics teachers an opportunity to air the challenges facing them, highlight the issues and find a way to overcome them. Additionally, it affords them the chance to share ideas with peers on effective teaching and instruction

strategies. They could also set goals and plans on how to achieve them. Contrary, the schools that did not engage in occasional or frequent discussions with their Mathematics teachers limit the opportunities for Mathematics teachers to air their grievances, challenges and ideas with the administration and their peers. As a result, the Mathematics teachers were left to deal with issues facing the teaching and learning of Mathematics, which compromises the performances in the subject. This was more so if the issue was beyond the Mathematics teacher's ability to resolve personally.

These findings were supported by the claims made by Gumus and Akcaoglu (2013), who reaffirmed that principals had essential instructional tasks which include leading in support of professional development programs and discussions. These tasks, pointed to the fact that one of the principal's role is to support the Mathematics teachers' growth whether directly or not. It could also be said that two significant behaviors of effective principals who absolutely affected learners' education talk with Mathematics teachers, model, give feed-back and provide opportunities for professional development.

The principals are supposed to have knowledge about instruction for them to give advice, assess, monitor and direct Mathematics teachers. The principal as the instructional leader was supposed to make sure that Mathematics teachers formulated challenging programs through their attendance of developmental workshops.

Besides, as an instructional leader, the principal must give other Mathematics teachers the chance to be involved in planning for staff development programmes because the end results was a feeling of ownership of the programmes. Additionally, Kyalo, Chepketer, and Kyalo (2016) claimed that the teacher capacity development had a significant effect on how the students performed.

In this case, it was evident that allowing teachers to come together with the administration is a major means of building their capacity. It provides a platform for teachers to interact with their colleagues, share insights, challenges and suggestions on how to address them.

However, it is evident from the chi-square findings that the majority of schools did not hold discussions with the teachers, which in turn has a significant effect on the students' performance. This shows that as long as schools overlooked the importance of holding discussions with the teachers to discuss pertinent issues, then students' performance would continue to be dismal seeing that the schools that hold frequent discussions performed well.

Conclusion

The researcher concluded that attendance of workshops and seminars were minimal and non-existent in majority of the schools and considering that there is a significant association between teacher's attendance of workshops and seminars and student performance in Mathematics. It was concluded that the poor attendance of seminars and workshop for professional development has negatively affected the school's performance in Mathematics.

Recommendations

i. The principals need to send their Mathematics teachers to more seminars and workshops to promote their professional development.

ii. The county government and other stakeholders should band together to provide resources and finances to support Mathematics teacher's attendance of seminars and workshops.

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The sustainability in fashion: a systematic literature review on slow fashion

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Abstract

A reflexive movement around the universe of fashion shows alternatives to combat unrestrained consumption. The weakening of textile resources found in nature, and the devaluation of local production, seeking significantly, attributes that are applicable amid problematization caused since obtaining fashion items until their disposal. The slow fashion movement appears as a counterpoint to the fast-fashion model, seeking to add value in a rational way to clothing items in the globalized market, inserting sustainability as the main propagator of this dynamic that grows in a dizzying way over time. Thus, the objective of this research is to identify how slow fashion has been discussed in academic research. For this, a systematic literature search was carried from its first publication, in 2008, until the year 2019. The research is classified as descriptive with a qualitative-quantitative approach. As a result, 105 papers were obtained, ranging from articles in journals and congresses to master's thesis and doctoral dissertations. It is a review of literature on how this topic is being disseminated amid the informational flow of fashion and its easy democratic access and debate, as well as the systematization of data that prove its existence and its interfaces that are relevant in business competitive level. About the results, we identified mostly qualitative research, focusing on the conceptual development of the area until at least mid-2017, with a change to practice during the year 2019, with exponential growth in recent years, especially in countries like Brazil and United States. It was also possible to define the term movement to characterize slow fashion, as well as to determine a holistic concept that better defines the vision of researchers in the area, with special focus on the works of Kate Fletcher. With this review, the necessary knowledge is exposed to deal

with the subject in question and expand this theme in other areas that are appropriate to it.

Keywords: Fashion. Slow fashion. Sustainability. Systematic literature review.

1. Introduction

In the 21st century, immediacy rules, and people want things at the moment that they see it. The innovation that appears every moment gains importance and the products are designed to generate automatic attraction for the consumer. In this context, fashion is shown to be substantial in the interactions that promote this encounter between consumer products and their respective audiences. Lipovetsky (2009) brings fashion as a social device. A visual and aesthetic representation of the society in which it is willing to present itself, with artifacts that are capable of measuring the changes that occur in a historical, geographical, and temporal, and characterized by human experiences.

Some authors, like Guillaume Erner (2015) claim that fashion arises during the Middle Ages, when the bourgeois tried to look like the nobles, imitating them, and these sought to differentiate themselves, so as not to be confused with lower classes, which demonstrates the antiquity of the fashion system. For centuries, the fashion industry was based on tailors and seamstresses, and so the production showed traces of craftsmanship and exclusivity, departing at any point from the idea of mass industrialized manufacture that is known in contemporary times. The products were planned and produced to be unique, in the mold of a particular person.

After the industrial revolution, with the appearance of factories, production became mechanized. What was previously done by seamstresses and tailors is now made by machines and, with this, mass production has become the main focus of the sector, providing a greater number of parts in the same time interval, surpassing the old manual system. Then, a renewal process was adopted where each decade revealed its styles that were influenced by the social, economic, and political experiences that made fashion a major milestone in each period.

As a consequence of industrialization, fashion has become more democratic and accessible. In the face of this mechanical evolution in the industry, consumption habits were also changing and assuming characteristics that aligned being with having. The more it was produced, the more the demand and consumption appeared as an increasing trend among the consumers.

Bearing this in mind, the enterprises started to see only the profits from this system of rapid industrialization as a segment of faster and more effective growth, forgetting the environmental problems that got worse with the increase in production and consumption. It is worth noting that fashion corresponds to the industry with the second-highest level of participation in global pollution, as well as consuming 70 million barrels of oil per year to produce polyester, a fiber that takes about 200 years to complete its decomposition (Seibel, Tybusch, and Gregory, 2019).

In addition to issues concerning human and labor ethics, as well as examples of works that present conditions similar to those in slavery and human exploitation, where precarious conditions are established for the fulfillment of business requirements and mass production, aimed at meeting the accelerated market

demand. Still, the topic of quality that permeates all points of the production chain is also seen (Barros, 2012; Oliveira, 2016; Sapper, 2018; Sapper *et al.,* 2019).

In fashion, the dizzying system of production and marketing became known as fast-fashion, which developed from Quick Response Management (QRM), producing on a large scale what the consumer most desires to return with a quick response to market (Solino *et al.,* 2015). Similar to fast food, the fast-fashion model was created to be distributed, sold, and consumed in ever greater quantities, with low prices and are brought to the market quickly (Fletcher, 2010).

Fast-fashion is seen as an ephemeral model of consumption and production, a fad that promotes its rise. It has mass production with a lot of variety, but with small stock, where stores offer new artifacts very often. Generating to the client the feeling that they need to consume the fashion item immediately before it becomes outdated or leaves the market (Cietta, 2010 *apud* Lima *et al.,* 2017).

This transaction in the fashion market, especially through fast-fashion, entails a sequential dynamic that ranges from the swelling of the textile economy to the depletion of natural resources. In search of moving away from the principles that govern this business model, as an antonym of semantic order, slow fashion emerges. Identifying the needs of consumers who demand a fashion with a more transparent and responsible production process, with products with characteristics of durability, comfort, and local and environmental enhancement, a movement arises that seeks to develop alternatives where they minimize the negative impacts caused by the acceleration of contemporary fashion, adding ideological values in the production of clothing and conscious consumption (Fletcher, 2010; Pereira and Nogueira, 2013; Watson and Yan, 2013).

In general, slow fashion is linked to actions of sustainability and conscious consumption. Within this modality, countless possibilities value fashion from the initial stages of fiber production to the valorization of local labor in the production process. Sustainability and conscious consumption within slow fashion comprise characteristics that help to properly identify its principles. Thus, the movement tends to relate to other denominations more specific to this direction, such as eco-design and green fashion.

About this consumption of sustainable fashion, in general, the use of recycled or organically produced fabrics reduces the expenditure of electric energy, ensuring at the same time that discussions about the reduction of polluting oil consumption will gain a spot; also, new forms of processing and washing seek to promote the reuse of water; as well as the reduction of waste resulting from production, they explore the best possible way of reusing it, thus avoiding the accumulation of waste, so that respect for the environment is always one of its priorities. (Lima *et al.,* 2018; Vasquez, 2019).

Thus, slow fashion seeks to stimulate the development of changes in the scope of current fashion, ensuring that the economy of this sector continues to grow, but favorably not only for society but also for ecosystems. Its practice includes mutual respect between all parties involved in the production process, ensuring that all people receive dignified treatment, whether socially or economically.

To analyze the different points of view developed within academic texts that deal with the theme, we sought to answer the following question: "How has slow fashion been disseminated in scientific studies in publications until 2019?". To answer this problem, an analysis was made of the data found to i) identify and categorize publications by year, journal, university, research area, country, research focus, method, type of approach and objective, and finally, ii) to analyze the state of the art of slow fashion.

To better synthesize the object of this study, it was necessary to use the methods from the systematic literature review methodology. The research was made for scientific works that addressed the topic in question and could have information that contributed to the knowledge of slow fashion as a phenomenon of contemporary fashion. This type of review makes it possible to gather relevant data for the development and understanding of the state and prospects for scientific research.

Considering the content addressed here, the article will present the following order, to see: in addition to this introduction, in the second part the method and metrics of systematization adopted within this research will be addressed. The third item will show the classification of the articles, dissertations and theses selected, in the fourth part the analysis about the state of the art of the subject in question will be developed and, finally, the final considerations in its last topic.

2. Methodology

A systematic literature review was carried out, which according to Conforto, Amaral, and Silva (2011) is characterized as a scientific methodology that aims to systematize and analyze all articles in a pre-determined area of science, being made comprehensively and reliably, clearly showing the resources used and the results achieved (Pai *et al.,* 2004), thus, regarding its type, it is theoretical research.

It is characterized as basic research that aims to obtain scientific knowledge, without the intention of practical applicability (Silva and Menezes, 2005). Besides, when describing, without interference, the information found in the review, it becomes research with a descriptive objective with a qualitative and quantitative approach, as it became necessary to directly evaluate the data, the points that could be counted, as well as subjective, which cannot be translated into numbers. (Prodanov and Freitas, 2013).

For the systematic literature review, eight steps were followed, adapted from the work of Solino *et al.* (2015): (1) choice of computerized database, (2) identification of keywords, (3) search of documents, (4) review of abstracts, (5) first exclusion of publications, (6) preparation of table of contents to be revised, (7) review of the complete texts, and (8) records of the selected texts. The next topic will detail how each stage was won.

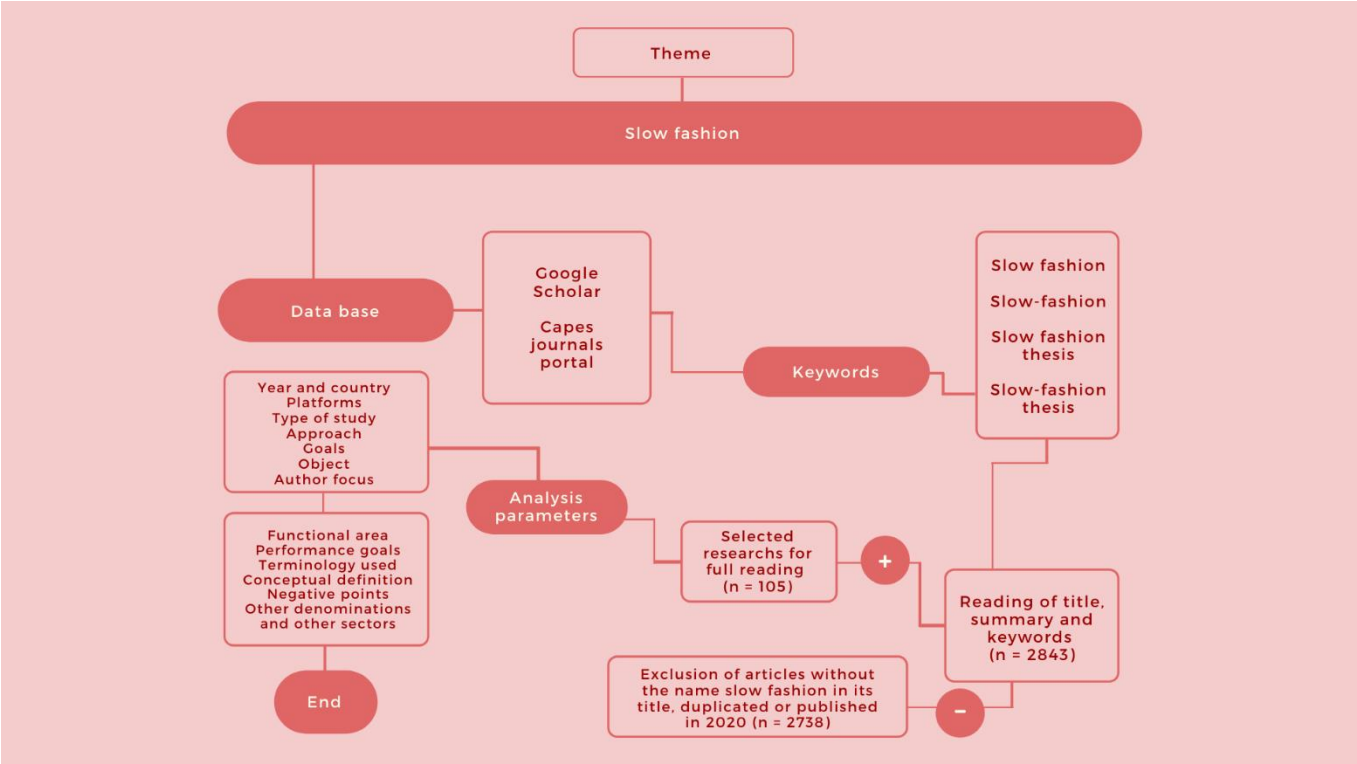
2.1 Methodological procedures

This study was designed through eight steps. First, (1) computerized databases were chosen. Those selected were: CAPES Periodicals portal (Coordination for the Improvement of Higher Education Personnel) and Google Scholar. It is worth noting that all selected congress articles have proceedings published with ISBN (International Standard Book Number) or ISSN (International Standard Serial Number).

In a second step, (2) the strategies that would be adopted to filter the works based on the limitation of the search terms used were planned. Thus, it should contain in the title, keywords, and/or summary of the publication, the terminology ‘slow fashion’ or its variations (slow fashion thesis, slow-fashion, and slow-fashion thesis). The aim was to restrict the search, making it precise and closer to the objectives. Thus, avoiding texts that only mentioned slow fashion quickly, focusing on those who talked about the topic and who were able to contribute more solidly to the literature review.

Then, (3) documents were sought by inserting the terminology ‘slow fashion’, and then refine the search

by adding expressions that characterize theses and dissertations. Thus, 124 papers were found, 29 on the CAPES Journals Portal, and 95 on Google Scholar. As publications were being found, a manual review of their abstracts, titles, and keywords was performed (4), to select the most relevant publications for the theme of this work (Graphic 1).



Graphic 1. Flowchart of the research selection strategy

Those researches that would not collaborate in the fulfillment of the proposed objectives of the systematic review (5) were excluded during the selection stage, this decision was based on the screening of texts through the criteria of initially not being fully available on the internet or that they merely pointed out the theme of slow fashion superficially, without sticking to any of its topics in a solid way, that is, without bringing the subject as relevant within the context of the research. The works published in the year 2020 were also eliminated, considering that the year is still ongoing and the research cycle was not yet finalized at the time of the practical development of this work. At the end of this basic review of works that corresponded with the metrics posted, the amount of published research comprised 105 academic texts that went on to the full reading stage, including articles from journals, congresses, dissertations, and thesis.

Subsequently, (6) to guide the most important points for the review, the metrics considered relevant on the topic were defined so that the analysis was carried out in the most systematic way possible, therefore, we sought to understand the context in which these works were allocated using the definition of their research sources and the places where these researches originated and were applied, also as these studies occurred over time, making it important to discriminate the applied methodologies, the concepts used to build the base the theme and the results obtained. To deepen the literature research, it was decided to configure the state of the art by guiding itself through the following script of topics: which terms are applied when referring to slow fashion; which companies were being studied within this area; its functional framing

areas; the performance objectives for which slow fashion provides a degree of competitiveness. And, finally, its applicability in other sectors and other possible terms used to describe the slow fashion was identified.

After, (7) a complete reading of the remaining 105 publications was made, as well as (8) the record of these works was done in parallel to the analysis and construction of the corpus of literature systematization work.

3. Classification of the analyzed productions

In this topic, the results about the analysis of the works mapped up to 2019 will be exposed, ranging from journal articles and conference proceedings with ISBN or ISSN to dissertations and thesis from graduate programs such as MBA, Master, and Ph.D. The publications were analyzed as to the progress of research over time, then the source of these texts was sought concerning their publishing and dissemination platforms, congresses, magazines, journals or university works.

Finally, for a better collection of information about the slow fashion theme, the methodological characterization of the texts was explored and explored in terms of the type of study, approach, objectives, and object, also examining them through the perspective of organization in which the authors of the texts are part, their host country and, the country they have as their research focus.

3.1 Development of studies through time

The first research published in the slow fashion area took place in 2008, but in the following year, in 2009, there was no publication. In the first triennium (2008 - 2010), the data showed the beginning of research in the area, with an average of approximately 1.5 articles per year. However, looking at Figure 1, it can be seen a gradual increase in the second triennium (2011 - 2013), where the average of published studies rose to approximately 3.5 per year, still showing an average increase of about 2 publications each year compared to the previous three years.

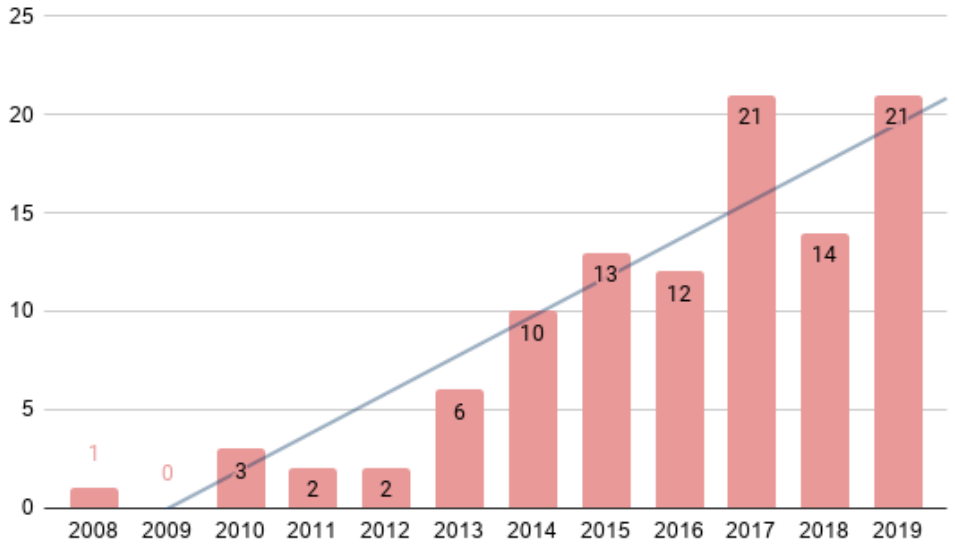


Figure 1. Researches over the years

The following two triennia represented the consolidation of study trends in the area, as they presented an exponential amount of research. Thus, the third triennium (2014 - 2016) presents a consolidated average of approximately 12 studies published per year. This increase continued in the following and last three years (2017 - 2019), rising to around 19 publications. In this perspective, having its linear apex in 2017 with 21 publications, this increase being significant and out of the average, only repeating in the last year, probably caused by the fact that this was the period in which the greatest amount of academic debates was disseminated. on topics related to sustainable development, including being the year of sustainability suggested and discussed through the color of the year Greenery, by the company specializing in prospecting and color trends, Pantone (Nascimento *et al.,*2018; Barros and Barden, 2019).

Still, society in general and fashion, included in this context, has been slowly moving towards a notion of a sustainable lifestyle, as exposed in works in the book published by Gardetti and Torres (2013), whether through consumption and valorization of thrift stores or discussions of its importance, which demonstrates greater acceptance through data that has only been increasing since the first three years identified. Through the information exposed, it is possible to notice a gradual increase in studies aimed at analyzing the fashion market and its integration with sustainability, in the search for alternatives for more ethical and conscious consumption.

3.2 Academic research and its sources

The 105 research that makes up the study is divided into 82 articles, 20 dissertations, and 3 theses. Thus, the articles were sub-categorized keeping in mind the publication platforms between journals and conference proceedings. Looking at the 49 texts published in journals (Table 1), it is clear that ModaPalavra, a Brazilian magazine, alongside the Fashion Practice and Sustainability journals have most of the launches, presenting 8.16% of the works each. Also, the periodicals Fashion Theory, Journal of Fashion Marketing and Management, Journal of Macromarketing, and Journal of Retailing and consumer services appeared with a greater number of texts, as they brought 2 publications each, representing 4.08% in the table.

Table 1. Quantity of slow fashion publications by journals

Journals	Quantity	Percentage
Fashion Practice	4	8,16%
ModaPalavra	4	8,16%
Sustainability	4	8,16%
Fashion Theory - Journal of Dress Body and Culture	2	4,08%
Journal of Fashion Marketing and Management	2	4,08%
Journal of Macromarketing	2	4,08%
Journal of retailing and consumer services	2	4,08%
International Journal of Consumer Studies	2	4,08%
Others	27	49,0%

The remaining 49%, that is, the highest amount shown in the table, is equivalent to journals with only one publication. With this, it is possible to conclude that, for this theme, due to its multidisciplinarity, it can be approached by many research areas, consequently there is no specialized magazine or periodical, which motivates a pulverization of periodic platforms. In common, it is identified that the journals have a scope focused on the themes of sustainability, fashion, marketing, or administration.

Among 32 articles published in conference proceedings (Table 2), those of national origin proved to be dominant - representing 50% of the number of congresses identified in the research, with the Brazilian Congress of Communication Sciences (Brazil) having the highest percentage of publications, with 9.38%. Then came the Fashion Colloquium (Brazil) and the Scientific Textile and Fashion Congress (Brazil), which account for 6.25% of slow fashion productions each. Externally, only the International Textile and Apparel Association (United States) matched the most dominant Brazilian congress, with 9.38% of publications, followed by the International Conference on Engineering and Product Design Education (United Kingdom) with 6, 25%.

Table 2. List of congresses that published research in the area of slow fashion

Congresses	Quantity	Percentage
Congresso Brasileiro de Ciências da Comunicação (Brazilian Congress of Communication Science)	3	9,38%
International Textile and Apparel Association	3	9,38%
Colóquio de Moda (Fashion Coloquium)	2	6,25%
Congresso Científico Têxtil e Moda (Scientific Congress on Textiles and Fashion)	2	6,25%
International Conference on Engineering and Product Design Education	2	6,25%
Others	20	62,5%

The other events have only 1 production each, representing 62.5% of the percentage of the final result, as shown in Table 2, these comprising 10 Brazilian congresses, 2 from India, 2 from Italy, 1 from Portugal, 1 from Sweden, 1 from China, 1 from the United States, 1 from France and 1 from Spain. The motivations for the low number of articles derived from congress annals can be attributed to the tendency of congresses to publish the articles in the annals in the format of a book chapter, with their appearance not happening frequently during the work mapping stage of this review. systematic bibliography.

Among the 23 dissertations and theses produced at universities (Table 3), only 1 university appears repeatedly, with two studies on the subject, the University of Borås (Sweden), which represents 8.70% of the percentage of publications. The other universities, in a total of 21 academic spaces, appear with only 1 work each.

Table 3. Enumeration of universities that researches slow fashion

Universities	Quantity	Percentage
University of Borås – SWE	2	8,70%
University of North Carolina at Greensboro – EUA	1	4,35%
Auckland University of Technology – NZL	1	4,35%
Blekinge Institute of Technology – SWE	1	4,35%
Cornell University – EUA	1	4,35%
Faculty of Fine Arts of Porto – PT	1	4,35%
Louisiana State University – EUA	1	4,35%
Lund University International – SWE	1	4,35%
National Institute of Fashion Technology – IND	1	4,35%
Oregon State University – EUA	1	4,35%
Radboud Universiteit – NL	1	4,35%
Stockholm Business School – SWE	1	4,35%
The Swedish School of Textiles – SWE	1	4,35%
Minho University – PT	1	4,35%
Estate University of Ohio – EUA	1	4,35%
Federal University of Paraná – BR	1	4,35%
Universiteit Twente – NL	1	4,35%
University of Oslo – NO	1	4,35%
University of Auckland – NZL	1	4,35%
Lisboa University – PT	1	4,35%
RMTI University – ECU	1	4,35%

When it comes to localization, most universities that deal with slow fashion are located in Sweden (6), followed by the United States (5), Portugal (2), Holland (2), and New Zealand (2), the other countries had only 1 incidence and were Brazil, India, and Norway.

Concerning the courses (Table 4), 20 different postgraduate courses were identified. Master in Business Administration appears more often, with 3 published works, followed by Doctorate of Philosophy with 2 types of research. The other courses (fourteen) appear only once, representing 5.26% each.

Table 4. List of graduate courses that research slow fashion

Courses	Area	Quantity	Percentage
Master in Business Administration[1]	Administration	3	13,04%
Doctorate of Philosophy	Science	2	8,70%
Master in Design	Design	2	8,70%
Master in Fine Arts	Arts	1	4,35%
Master in Image Design	Design	1	4,35%
Master in Applied Textile Management	Management	1	4,35%
Master of Arts	Arts	1	4,35%
Master of Business in Marketing	Administration	1	4,35%
Master of Science	Science	1	4,35%
Master of Strategic Leadership towards Sustainability	Management	1	4,35%
Master in Culture, Environment, and Sustainability	Social science	1	4,35%
Master in Textile Management with specialization in Fashion Management	Management	1	4,35%
Master in Environmental Studies and Sustainability Science	Sustainability	1	4,35%
Master in Business Administration com foco em Gestão Estratégia[1]	Management	1	4,35%
Master in Communication, Art, and Culture	Communication	1	4,35%
Ph.D. International Business	Administration	1	4,35%
Master in Marketing	Marketing	1	4,35%
Master in Design, Development, and Innovation in Clothing and Fashion	Design	1	4,35%
Master in Textile Management	Management	1	4,35%

The works were gathered observing them according to their main areas of application. Thus, it was identified that the projects are mostly produced by courses in the area of Administration (34.78%), Design (17.39%), Science (13.04%), Arts and Management (8.70%, each), followed by the areas of Social Sciences, Sustainability, Communication, and Marketing, representing 4.33% of the main area of their courses, each. As for the qualification levels, the theme is being more widely addressed in Master's courses (52.17%), followed by postgraduate courses with a focus on specialization, being more specifically those

[1] Master of Business Administration is seen in Brazil as a postgraduate course in the sense of specialization, focus in the professional practice, and not a master's or doctoral research program.

in the Master of Business Administration (MBA) category. (17.39%) and, finally, Ph.D. level courses (10.53%).

On the other hand, the number of works mapped within the present systematic literature review may result from the existence of works that deal with the theme at some level, but that does not include the term 'slow fashion' in its title. Because, although the theme of sustainability is increasing, it is being treated with very specific research focuses, where each author focuses on different solutions for the area. That phenomenon ends up making it difficult to bring these works together in just a holistic concept.

This effect can be seen through the low quantity of works coming from relevant and specific events for the fashion area, such as, for example, the Fashion Colloquium (Colóquio de Moda), an international congress that took place in Brazil that has one of its proposals for Scientific Initiation and Groups of Research entirely dedicated to the exhibition of studies dealing with sustainability and its areas when related to fashion, but which in this systematic review presented a low volume.

3.3 Methodological characterization of the researches

The types of studies concern the research modalities or methodologies adopted to obtain the results and data that will compose the research. The main methods are Case Study, which aims to contribute through in-depth analysis of a single object; Literature Review research, in which it aims to define a problem in a focal way, as well as to identify, based on that, the state of the art of a given theme; Analytical Research, in which it seeks to develop in-depth analyzes of the situation of a fact; Experimental research, works with the selection of variables based on the choice of a study object and identifies the effects of these variables on the object; Survey, which is similar to market research, where the data, usually quantitative, is obtained through a research instrument, about a population group when it is related to a topic; Focus Group, seeks to bring together a group of people to recognize perceptions about a research concept or problem (Dias, 2000; Freitas, 2000; Lakatos and Marconi, 2003; Ventura, 2007; Gil, 2008; Fontelles *et al.*, 2009; Bento, 2012; Gil, 2017).

Regarding the types of studies found within the present systematic review, it is noteworthy that some publications presented more than one method, with emphasis on the predominant methodology used in the research, which is accounted for quantitative reference on this topic (Figure 2). Works supported by Case Studies (CS) constituted 31.4%, while the Literature Review (LR) (29.5%) is in second place, showing that a good part of the research is still in the theoretical development phase, which may signal that slow fashion is in the consolidation phase of concepts for later application in the business sector. Then, the Survey type (S) appeared with 14.3%, followed by the Analytical Research (AR), which appears with 13.3%, and the Experimental type of study (EX), with 7.6%. Finally, the Focus Group (FG) presents 3.8% of the works.

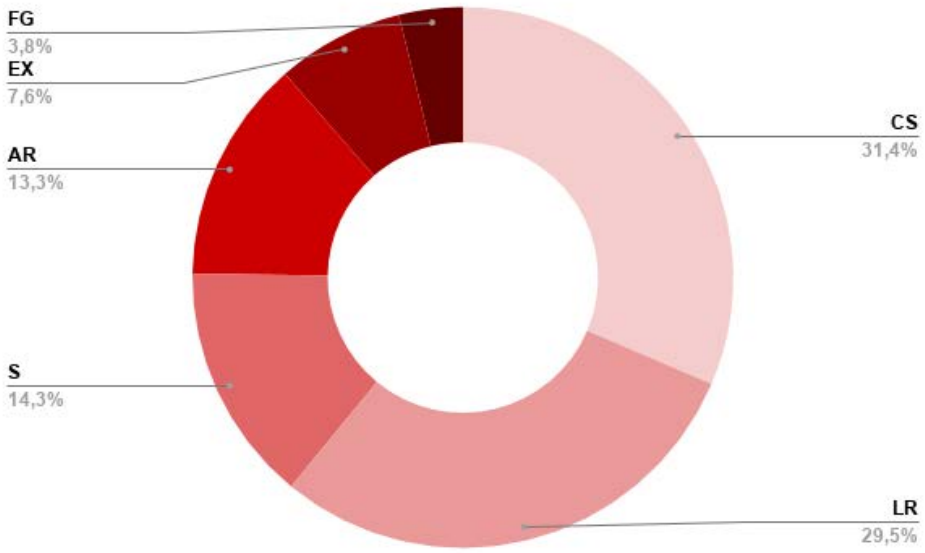


Figure 2. Distribution of researches mapped by type of study

It is worth mentioning that of the 15 of the Survey studies found in the general research, 8 correspond to the year 2019, wherein the same year only 3 Literature Review studies were found. That demonstrates a departure from this exploratory theoretical perspective of the commented concept previously to emerge in the practical application of the slow fashion movement. These data prove the growing search for finally understanding this audience of slow products and in the scope of how it is possible to convert their perceptions of value to the areas of marketing, production, and product development.

As for the research approach, the largest number of texts was classified as qualitative with 67 of the 105 publications mapped, which represents 63.81% of the overall result. Those classified as qualitative-quantitative represented around 14.29%, followed by studies with a quantitative-qualitative approach (12.38%) and, finally, publications of a quantitative nature (9.52%).

Concerning the object of study, literature research was present in most of the works, with 54.29%, thus being in line with the results of the type of study found, since 33.33% of the works it is a Literature Review, as mentioned in the previous paragraph. Then, Field Research obtained 37 publications (35.24%) and, Laboratory Research, represented about 10.48% of the percentage. Both field research and laboratory research had a significant increase in representativeness in the last mapped year, 2019, also corroborating the already mentioned, about the search for the theoretical application of slow fashion has begun to expand to a more practical level.

Regarding the objectives, the Exploratory research was shown in greater quantity, corresponding to 68.6%, that is, 72 texts, the Descriptive 27.6%, and, only lastly, those of the Explanatory type that represented about 3, 8% of methodological approaches to publications.

The author's headquarters organization concerns the place where the works start from, that is, the environment in which the authors work in their research. That said, Universities were the majority in what concerns the author's headquarters organization, with 61.90%, followed by Companies (36.19%) and finally, Research Centers, with only 1.90%.

As it is a reasonably new theme, having just over 10 years of conceptual explorations, the hypothesis of

walking in a process of discoveries and adaptations opens up, thus, the Exploratory objective as predominant tends to corroborate this hypothesis, together with the type of Literature Review study as one of the main ones, as well as Universities as the research headquarters. On the other hand, the works that occur with a focus on Research Centers are more debated in developed countries, such as Germany and Australia.

By observing the predominance of research that follows a qualitative approach and, therefore, involves the subjectivity and perception of communities, individuals, or research variables, one can explore the hypothesis of slow fashion as a social movement or, along the same lines of reasoning, of a consumer movement with a bias that emerges in society, instead of seeing it, more vehemently, as a business model, with quantitative bases. It is also identified that the mapped researches bring aspects that involve social media and human ethical subjectivity, specifically addressing themes relevant to the current historical-social context, such as sustainability and conscious consumption.

3.4 Author's residence and headquarters of the study object

The following topic addresses the host country of the authors responsible for developing the research, being graphically exposed through Figure 3, showing Brazil as responsible for the largest number of works (31), a relevant data when discussing the theme, as research by Solino *et al.* (2015) about the fast-fashion model, the country did not even appear on the list. This result may be a consequence of the growing number of schools of fashion and design in Brazil, as well as the constant interest in research involving sustainability and practices that respect the environment.

Then the United States (20), Sweden (7), United Kingdom (6) and China (5); Portugal and Turkey denoted 4 surveys each of the countries; India, Norway and New Zealand (3); South Korea, Holland, Australia, Spain, and England present 2 works each. The other countries appear with only 1 work each, where they can be viewed in a specific way in the following figure.

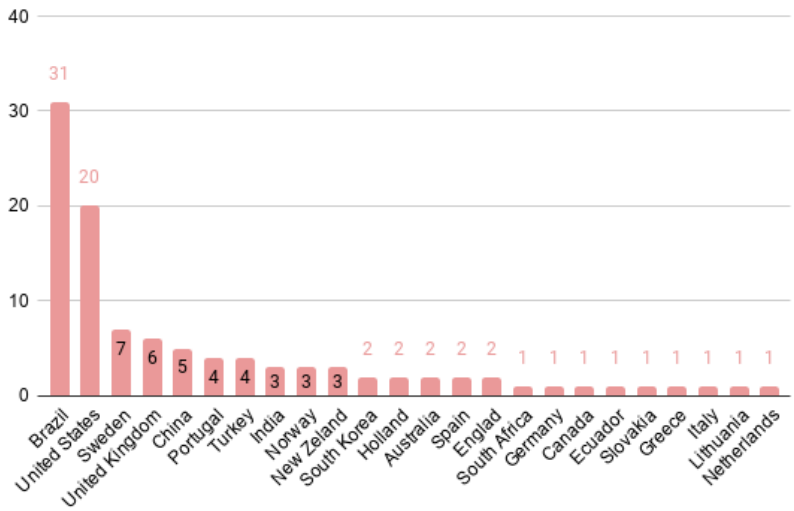


Figure 3. Research host countries

In addition to defining the country where the survey was written, we also sought to find out where these surveys were applied (Figure 4). In this topic, the United States takes the lead, with a total of 18 publications

that discuss slow fashion within the country, right after this, Brazil appears, with 12 works, followed by the United Kingdom in 6 publications, Sweden in 4 surveys, as the countries Turkey and New Zealand appear in 3 surveys. Finally, the other countries (including Canada, Holland, India, Lithuania, Portugal, and Germany) with 1 work each. The leadership of Brazil and the United States is because most of the research is written in these two territories, thus investigating the very environments in which they are located geographically.

From another perspective, it is possible to notice that some differences are the result of the existence of works where writing occurs in one country, while the application occurs in another, these relate to 12 types of research found. There were also incidences of investigations that work from a large number of countries, one can cite as an example the research by Seifert (2019), who in his thesis studies and compares nominally unidentified companies from 14 countries around the world, covering almost all continents, except for Africa and South America. In this perspective, each of the countries mentioned by the authors of the works discussed was counted within this literature review.

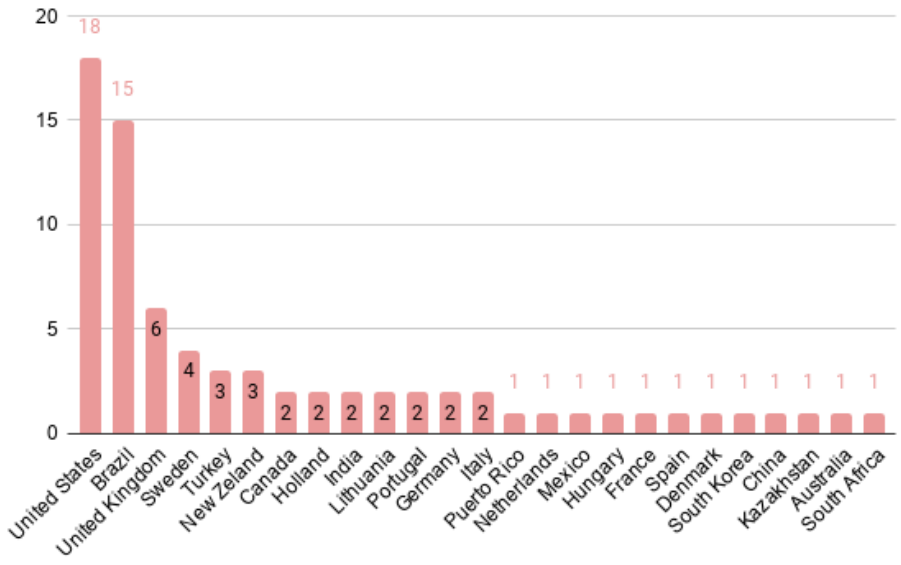


Figure 4. List of countries researched

Making a comparison between the countries where the research was conducted and the countries in which it was applied the most, we can see that, even though the keyword of this review is in English (slow fashion), the country that dominates in numbers of works in Brazil. That's because although be it a foreign term, its industrially and socially usual pronunciation has become fixed among researchers as a way of becoming a counterpoint to studies that emphasize fast-fashion.

4. State of the art about slow fashion

In the following topic, the current state of the art of the slow fashion theme will be explored, seeking to share and analyze the content covered by the research mapped through its functional area, its performance and differentiation objectives, the holistic conceptual definition, a term used to characterize it, the negative points, as well as denominations and applications of its principles directed to other possibilities of existing

sectors.

4.1 Functional area and performance objectives

The functional areas of a company are divided into two when considering the discussions by Slack *et al.* (2013). This author characterizes them in: central functions and support functions. To the first, the areas of marketing, product development, and production are located in it, while the second concerns the areas of accounting, finance, and human resources (Solino *et al.,* 2015).

In a second step, the need to expand the possibilities of categorization was identified. Reaching the text by Oliveira (2006), where the author expresses that there are seven functional areas in a company and these are separated into two groups: final functional areas - which they cover the activities directly involved in the cycle of transforming resources into products and their availability in the market - and functional medium areas - that group the functions that provide the means for the transformation of resources into products and services and their situation in the market. In this way, the Marketing Administration and the Production Administration contemplate the final functional areas, while the Materials, Financial, Human Resources, Services, and Business Management Administration covers all those functional areas.

Summarizing the findings of the researched literature, through the functional areas identified in this study, it was possible to verify the direction of the work for six of the functions mentioned above, they are: Marketing, Product Development, Production, Industry, Materials, and Human Resources, as is you can see it in the image below (Figure 5).

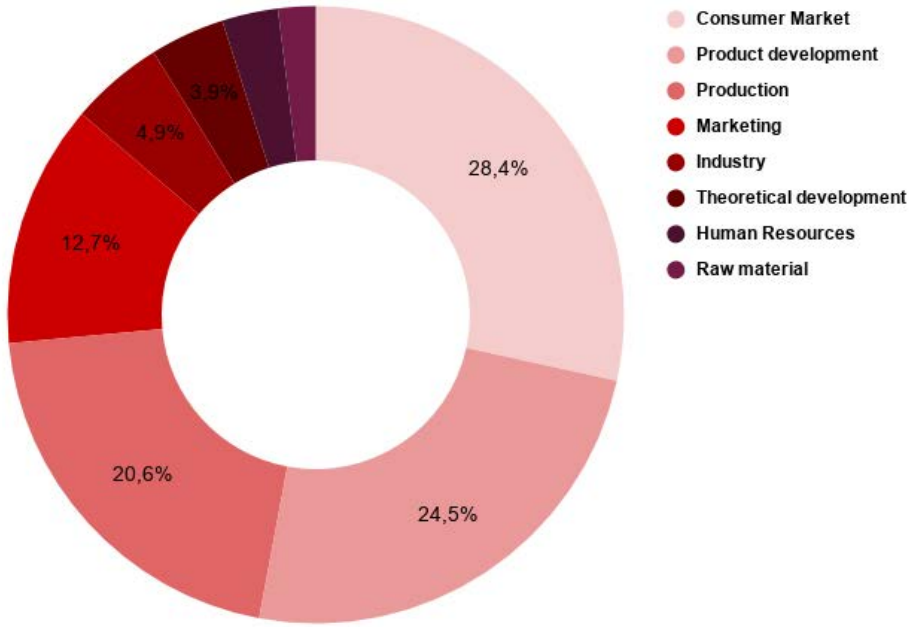


Figure 5. Functional areas of slow fashion

It was also possible to verify during the research the appearance of works in another area that was not mentioned by Oliveira (2006) or Slack *et al.* (2013) as belonging to a company, being the Consumer Market, which appears in 28.4% of the studies, occupying the first place in occurrence. This adherence to the functional area is justified based on authors such as Dias (2015), who take the opportunity, in his

research, to report the importance of the consumer as an input of information about the market demand to be transformed into products or processes.

In addition to companies, the academic area was also present. The Theoretical Development sector manifested itself in 4.9% of the works, with these studies investigating the concepts involved in the slow fashion area, thus seeking to understand the dynamics that encompass this theme for later practical application. The theoretical explanation for this event can be found in the work of Pérez and Vera (2019), where the authors discuss in their research precisely the industrial unpreparedness to deal with production focused on the sustainable character of artifacts, dealing with the need for specialization in the area.

Through the discovery of the most researched areas being product development and the consumer market, it is possible to understand that, as the research was until recently only focused on the initial phases, the researchers still did not focus on the technical parts as issues of raw material, industry or production, in contrast, investigations are mostly focused on how the movement is perceived by consumers and how products gain space within this business model. From these results, manufacturers can guide their productions and creations to serve this specific audience.

Solino *et al.* (2015) divide fast-fashion concerning 5 main objective variables by which the model performs aspects of competitiveness, these being speed, flexibility, delivery reliability, cost, and quality. In comparison, about the performance objectives of slow fashion, the mapped texts presented the term being overwhelmingly and directly linked to the item quality (87.63%). Then there was reliability (10.31%), which was also present as a way of seeking recognition for a movement that needs to obtain its space in the production chains. And lastly, the cost (2.06%).

There were no citations regarding the other performance objectives, such as speed and flexibility; the speed can be attributed to a characteristic that is inherent to the very conception of slow fashion, being the aspects of a fashion production with reduced speed, to last longer and with principles of timelessness, so this speed is linked to fast-fashion, it doesn't work in slow fashion. About flexibility, it is argued that in slow fashion, products have manual production characteristics, which are invariable and with well-defined and relevant social justice, therefore, in the production of slow consumer goods, there is no need for production is flexible, so this feature does not appear within the mapped texts.

Because slow fashion presents research in early stages, the main elements that guide the theme are not yet defined and unified, so that there is a strong branching between the elements that characterize it, such as the differential aspects of this movement concerning other existing models.

Therefore, it was still possible to identify other types of events by which slow fashion plays aspects of competitiveness or adding value, however, few of them add up a relevant part of the findings, as the others appear as supplementary objectives. it can be concluded that the main objectives of slow fashion are: Sustainability, which appeared in 26.69% of the researches, followed by Ethics (20.32%) and Durability (12.75%), still as prominent aspects, Localism and Timelessness appeared with 7.97% and 5.98%, important objectives such as Exclusivity (4.78%), Authenticity (3.19%), Functionality (2.39%), Comfort (1.99%)) and Equity (1.99%). The other objectives add up to about 11.95% together. In Figure 6, presented below, it is possible to graphically visualize the relationship of other types of performance objectives within the slow fashion.

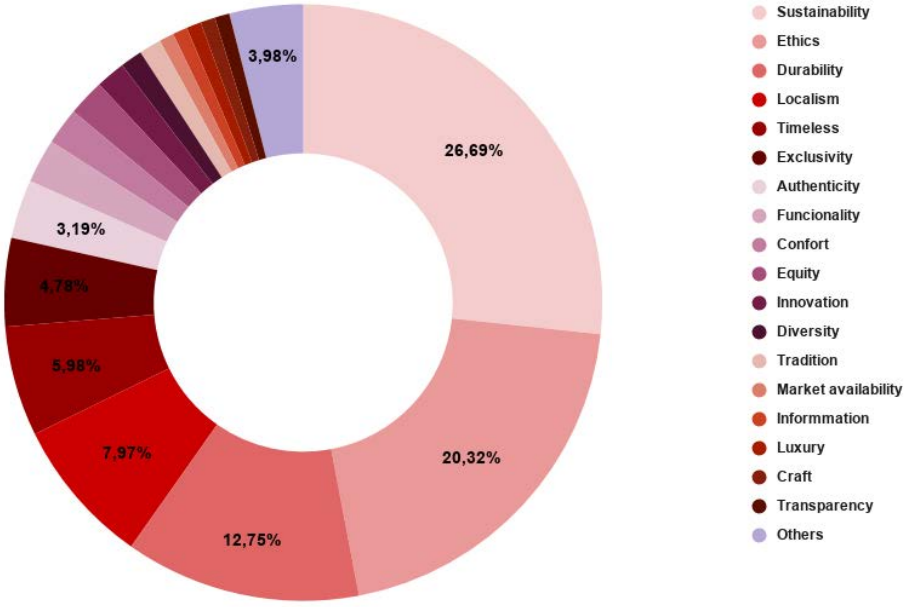


Figure 6. Other slow fashion performance objectives

Investigating its performance objectives, quality configured the main role, an aspect that makes its great difference about the characteristics of fast-fashion that develops mostly low-quality products, therefore, reliability came right afterward, at the same time that slow fashion products carry narratives of local and sustainable valorization. However, the cost was among the few jobs due to being products with much higher production costs, not coming close to any level of products from fast-fashion. They made appearances such as sustainability, ethics, durability, localism, and timelessness, emerging as the main elements that guide the theme. Within the slow fashion narrative, Eriksson and Karlsson (2014) explain that retailers use the emotional appeal of these performance objectives to generate a connection between the consumer and the product, which can be done by companies, generating added value.

Some more specific performance objectives identified, such as equity, in addition to authenticity, functionality, localism, and exclusivity are the five basic principles that guide the notion of building a consumer perspective of slow fashion products, concepts proposed within the research by Jung and Jin (2014) and recognized by the vast majority of works systematized in this literature review research. Şener, Bişkin, and Kılınç (2019, p. 8) add by stating that "as a result of slow fashion products' perceived value, consumers who would like to have slow fashion clothes are willing to pay higher prices for these clothes". In this sense, these basic principles can guide the perception of consumers in creating value for slow products.

Both Jung and Jin (2016), as well as Şener, Bişkin, and Kılınç (2019) developed research to determine the perceived value of consumers of slow fashion products, considering these 5 basic perspectives. The first survey investigated US consumers, as the second focused on investigating consumers in Turkey and Kazakhstan. It is relevant to perceive a certain difference in the projection of value, while Turkish consumers expressed a greater connection with authenticity, localism, and exclusivity, Kazakhstan consumers explore a more positive relationship with the plans of social justice, functionality, localism, and

exclusivity. However, in the case of the United States, only the exclusivity plan was perceived as positively affecting the perception of the value of this group of consumers studied.

Concerning the companies that were most studied when related to research, fruits of slow fashion, it is worth mentioning that, within the universe of organizations, micro-enterprises appear in greater quantity, corresponding to 7.35% of the published works. Its followed by the companies such as Armário Orgânico (Brazil), Brisa (Brazil), Cantrelle Design (Brazil), New York fiber farms (United States), Filipa K. (Sweden), Keep and Share (Local unacknowledged, possibly England), Norrøna (Norway), Plusminusnoll (Sweden), with 2 appearances in the studies each. It is possible to develop a hypothesis that this dispersion of companies is a consequence of slow fashion companies having a local and small character, that is, a low concentration, unlike fast-fashion, which has been brought by Solino *et al.* (2015), are configured as large chain stores that sell fast-fashion products around the world, such as Zara and Hennes & Mauritz - H&M.

Some research is conducted aimed entirely at New York fiber farms with the justification of helping to remedy their problems. “We developed this research in response to NY fiber farmers’ difficulty reaching their markets and low economic profits”, looking for slow fashion as an alternative to achieve these results (Trejo, 2014 *apud* Trejo, 2019, p. 2).

In this sense, it was possible to observe a phenomenon of very strong localism to the focus of the companies studied, arguing based on the non-existence of major brands that practice slow fashion as a business model, being more commonly present in small brands, with localism or authorial fashion bias. Consequently, its use is more focused on adding value through sustainability, instead of being used as a business model with the objective of mass profit in the industrially practiced production process.

4.2 Terminology used in quote slow fashion

Among the 105 works analyzed, 98 uses some specific terminology to classify what would be slow fashion within a conceptual view. Thus, as can be seen in Figure 7, the term 'movement' was more present, mainly when it compares with other expressions (59.18%). Unlike fast-fashion, where Solino *et al.* (2015) demonstrates that the most correct term would-be model, because it is used as a business model, this is not what happened with slow fashion, appearing in the literature called as a movement, even though, at the same time, it is seen that the courses that most study the theme, when it comes to graduate studies, are those in the administrative area, instead of the social sciences (see Table 4 in the 3.2 topics).

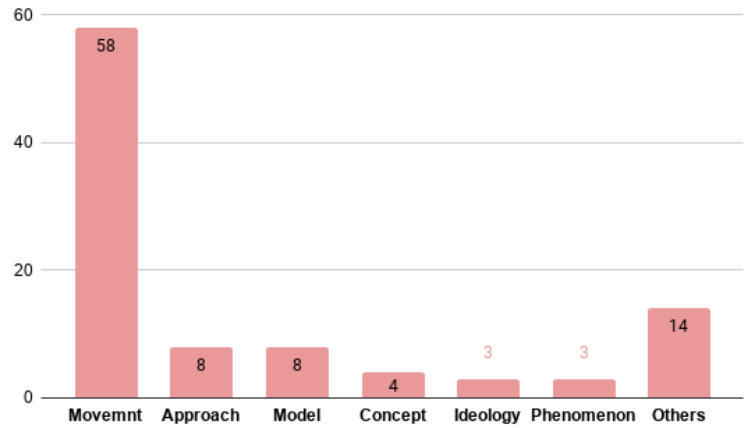


Figure 7. Terminologies used to classify slow fashion

From these results, two conceptual notions can be explored to explain the emergence of slow fashion as a movement. The first emerges in its approach to sustainability and the fashion business, thus, the movement is seen as having a social impact bias, but, at the same time, having the character of a business model. This all leads to the idea of social entrepreneurship, addressed by Parente *et al.* (2011), also more currently by Machado *et al.* (2020), in the most basic way possible, as an alternative to balance the search for profit by companies and their actions of innovation and social impact, thus achieving a return both socially, from an ethical-cultural perspective, as well as financial, from a commercial point of view. Social entrepreneurship is configured as making profit-generating positive actions for a society.

Thus, it is possible to allocate fashion within this system based on the identification that natural resources are already depleted, as much as the debates about human exploitation increase. One can attribute the high degree of studies coming from the people of administration because they understand that this movement of social entrepreneurship applied to fashion, would be the future of business, the best way to put companies back in a society that demands these principles in the contemporary era.

In another discussion, it is identified that slow fashion began with the dynamics of slow food, which in turn served as inspiration for all movements called simply slow movements (encompassing subdivisions such as slow cities, slow design, slow living, slow food...). Whose principle is to slow down the lifestyles and consumption of individuals, developing healthy thoughts in industrial production, and making human beings more aware and responsible for their actions towards the environment. Understanding slow fashion as a result of this general movement, it can be inferred that the denomination of movement for slow fashion arose simply from its primordial association with the entire slow movement (Moura and Carlan, 2015; Conti and Figueiredo, 2017; Sapper *et al.*, 2019; Thompson, 2019).

4.3 Conceptual definition of slow fashion

From the analysis of the 105 texts, 79 works were found that conceptualize slow fashion at some level, and through it was found 35 different concepts. That emerged between the years 2007 and 2016. After that, in the years 2017 to 2019, it was not noticed any formation of a new concept being used as reference only old definitions, it is motivated by the fact that, although not widely studied, the concepts that guide the slow fashion movement are well known.

After listing all the concepts, the 12 most cited in the survey were listed below (Table 5). The most referenced concept with a considerable margin of difference was that of Fletcher (2007; 2008; 2010; 2012), appearing in 45 pieces of research. Kate Fletcher is a professor and researcher in the field of sustainability, design, and fashion at the Center for Sustainable Fashion at the University of the Arts London (United Kingdom), and in 2018 co-founded the Union of Concerned Researchers in Fashion. Fletcher is known as a leading figure in the development of the slow fashion movement. Fiorin (2017) even explains that she was responsible for coining the term 'slow fashion'. In addition to her concepts expressed in individual works, the author also appeared again with Lynda Grose (2011; 2012) with work quoted four times; Lynda is a professor in the Fashion Design program at California College of the Arts (United States).

The concept of Pookulangara and Shepard (2013) appears next being cited within 11 texts; Sanjukta Pookulangara is a professor at the University of North Texas (United States) and Arlesa Shepard is a professor at the State University of New York (United States). The third most cited concept is that

developed by Clark (2008), appearing in 10 surveys; Hazel Clark is dean of the School of Art and Design History and Theory at Parsons – The New School for Design (United States).

Table 5. Slow fashion concepts

Cited author	Concept	Authors who cited
Fletcher, 2007/08/10/12	Slow fashion is to design, produce, consume and live better considering the environmental and social sustainability and producing beautiful and conscious clothes	Cataldi *et al*, 2010; Refosco *et al*., 2011; Gonçalves; Sampaio, 2012; Kipöz, 2013; Tobeck, 2013; Eriksson; Karlsson, 2014; Karaosman *et al.*, 2014; Jung; Jin, 2014; Ertekin; Atik, 2014; Jung, 2014; Trejo, 2014; Ramirez, 2014; Søderlund; Berg, 2015; Jung; Jin, 2015; Henninger, 2015; Mardell, 2016; Pal, 2016; Jung; Jin, 2016; Trejo; Lewis, 2016; Nishimura; Gotijo, 2016; Martins, 2017; Zilinskaite, 2017; Vicent, 2017; Hall; Boorady, 2017; Descatoires, 2017; Hall, 2017; Fiorin, 2017; Kerner, 2018; Hernández, 2018; Perini, 2018; Fiorin *et al.*, 2018; Bernardes *et al*., 2018; Sobreira *et al.,* 2018; Macena *et al.*, 2018; Clark, 2019 Trejo *et al*., 2019; Şener; Bişkin; Kılınç, 2019; Bellido-Perez, 2019; Seifert, 2019; McNeil; Snowdon, 2019; Nishimura; Schulte; Gontijo, 2019; Pencarelli, 2019; Vaz, 2019;Brewer, 2019; Sapper *et al.*, 2019.
Pookulangara; Shepard, 2013	Slow fashion is characterized as a business model that sees the whole, taking into account social, environmental and economic systems	Karaosman *et al.*, 2014; Mardell, 2016; Preuit; Yan, 2016; Zilinskaite, 2017; Vincent, 2017; Fiorin *et al.*, 2017; Overdiek, 2018; Fiorin *et al*., 2018; Presley; Meade, 2018; Thompson, 2019; Garcia; Helena, 2019.

Clark, 2008	It's characterized by three main principles: 1. Appreciation of local economies and distributed economies 2. Transparent production systems with less intermediation between consumer and producer 3. Production of sustainable and sensory products that make the senses more intense have a longer life and are more valued than typical consumables	Tobeck, 2013; Jung, 2014; Langdown, 2014; Ramirez, 2014; Ertekin; Atik, 2014; Mardell, 2016; Descatoires, 2017; Kerner, 2018; Fiorin *et al.*, 2018; Casto; DeLong, 2019.
Ertekin; Atik, 2014/15	Covers notions of conscious consumption and production processes that value the well-being of workers, local communities and the environment	Kerner, 2018; Sobreira *et al.*, 2018; Descatoires, 2017; Villiers; Duh, 2019; Gupta; Gwozdz; Gentry, 2019.
Fletcher; Grose, 2011/12	Slow fashion is more than reducing production speed, but it represents a new way of seeing the world, where there is a break with current industry practices with the values of fast fashion	Ferronato; Franzato, 2015a; Ferronato; Franzato, 2015b; Filipe *et al*., 2017; Fiorin *et al.*, 2017.
Cataldi et al., 2010	Strategy to bring the fashion industry to sustainability	Trejo, 2014; Valente *et al.*, 2015; Ertekin; Atik, 2014; Silva; Busarello, 2016.
Holt, 2009	Slow fashion, therefore, needs to be seen as a more sustainable way of consuming clothes, while involving environmental, social and ethical interests	Pookulangara; Shephard, 2013; Diggele, 2017; Ferronato; Franzato, 2015b.
Salcedo, 2014	It is just a different approach, according to which designers, buyers, distributors, and consumers are more aware of the	Rodrigues *et al.*, 2018; Rodrigues; Souza, 2018; Perini, 2018.

	impact of clothing on people and ecosystems	
Ko, 2010	Slow fashion is activism for the problems of fast fashion in a practical sense and is a phenomenon of fashion as a theoretical critique of accelerated Society	Ro; Kim, 2011; Lee; Ahn, 2015.
Slow fashion Award, 2010	Based on sustainability within the fashion and design industry, incorporating high quality, small lines, regional productions, and fair working conditions	Pookulangara; Shephard, 2013; Pookulangara *et al.*, 2016.
Business of a Better World, 2012	Slow fashion organizations produce collections each year, while fast fashion companies create 20 fashion lines a year	Henninger, 2015a; Henninger *et al.*, 2016.
Silva; Busarello, 2016b	A movement that prioritizes care, quality, and long-term production	Conti; Figueiredo, 2017; Conti *et al*., 2017;

Analyzing the definitions found, it is clear that the term slow fashion already has a conceptualization with its well-established points, as well as commented at the beginning of the topic, given the number of times they were applied, with characteristics of origin and reliability, which is the proposed by Fletcher (2007; 2008: 2010; 2012), the predecessor of the movement, where he defines that the slow fashion movement comprises designing, producing, consuming and living in a healthier way considering environmental, social, ethical and moral sustainability, producing clothing that maintains aesthetic attractiveness and at the same time is aware of its effects on the environment.

Although a greater number of works began to appear only in the year 2010, there are incidences of concepts mentioned before that year, such as the concepts of Fletcher in 2007 and 2008, Clark in 2008, and Holt in 2009, where only Clark's work (2008) was present quantitatively at systematic review, the other works were only mentioned through other publications. The motivations for the non-appearance of these texts in the present systematic review stems from the fact that Fletcher's 2007 work is configured as a book and that of Holt (2009) comprises an article with a non-scientific focus published on a website and not in

congresses. or journals, in this way, neither of the two publishing platforms is the focus of this literature review.

It is argued, in turn, that there were already issues related to slow fashion being discussed within some dynamics before this period, however, they were not yet relevant enough to provide basic terminology to this area of studies. It was observed, at the end of the research, that the existence of conceptualization before the first text found also, on the one hand, is due to Fletcher's research on sustainability in a broad way, mainly applied to fashion, therefore, the author identified the need to develop a nomenclature to characterize this idea. Thus, the name of slow fashion that is known today. It is understood, then, that Fletcher did not have slow fashion as its sole focus, but sustainability in a complete way when it relates to fashion.

4.4 Negative points of slow fashion

Despite the slow fashion found within a chain that has positive principles, such as sustainability, conscious, and ethical consumption, the analyzed texts nevertheless highlighted negative aspects of the movement. Regarding the negative points that were identified to the movement, the high cost in its production and commercialization appears in 28 works. Other aspects such as aesthetic characteristics that refer to the rusticity and the delay in launching collections appeared in 2, while the lack of knowledge about this movement appeared in 1 study (Table 6).

Table 6. Negative points of the slow fashion movement

Negative points of the Slow Fashion	**Authors who support that idea**
The high cost (27)	Johansson, 2010; Refosco *et al.*, 2011; Gonçalves; Sampaio, 2012; Shephard; Pookulangara, 2013; Watson; Yan, 2013; Pereira; Nogueira, 2013; Tobeck, 2013; Lee; Ahn, 2015; Leslie *et al.*, 2015; Jung; Jin , 2016A; Jung; Jin, 2016B; Nishimura; Gontijo, 2016; Zilinskaite, 2017; Duiveman, 2017; Preuit; Yan, 2017; Candan *et al.*, 2017; Silva *et al.*, 2017; Fiorin *et al.*, 2017; Fiorin, 2017; Şener; Bişkin; Kılınç, 2019; Sunga; Woob, 2019; Pencarelli, 2019; McNeill; Snowdon, 2019; Bellido-Pérez, 2019; Gerard *et al.*, 2019; Sapper, 2019; Vaz, 2019.
Low knowledge (3)	Pookulangara; Shephard, 2013; Şener; Bişkin; Kılınç, 2019; Pérez; Vera, 2019.
Low launch of collections (2)	Henninger, 2015; Siqueira, 2016.
Rusticity (2)	Moura; Carlan, 2015; Conti *et al.*, 2017.
Potentiation of the consumption during seasonal periods (1)	McNeill; Snowdon, 2019.

The perceived high cost is related to the fact that the pieces usually use expensive raw materials, due to their durability, quality, and handcrafted aspects, or also as a consequence of paying fair value labor, where, consequently, the sum of all these requirements, it increases the cost values that the final product will have. The characteristics of rusticity are highlighted by the consumers' projected perception of products with symbolic dimensions that denote sustainability, as Moura and Carlan (2015, p. 479) say that "a large portion of the population resists green and ecologically friendly products, as they associate products with rustic-looking finishes ", which may end up being an obstacle to the purchase motivations of consumers who are interested in products perceived as modern. Thus, there is an opportunity to explore the application of modernity concepts in line with slow fashion products.

The low launch relates to the few annual editions of slow fashion collections, usually happening only twice a year, as characterized by its principles, Henninger (2015, p. 6014) says that this "contrasts starkly with the fast-fashion industry, which produces approximately 20 fashion lines per annum". In turn, the low knowledge deals with the lack of information of individual consumers about the practices of slow fashion and all the precepts and prejudices that this movement carries, this negative point meets the characteristics of rusticity perceived by consumers, where everything encompasses the narrative constructed and disseminated socially about this movement.

It is worth commenting on a negative topic addressed by McNeill and Snowdon (2019), where he discusses the potentiation of consumption in specific periods. Thus, individuals would make use of the ideas propagated by slow fashion as a justification for consuming in large quantities, but in only certain periods of the year, the authors refer to these periods as seasonality. Following this line of thought, there would be no truly conscious idea implanted, but rather excessive consumption in specific perspectives, which would be harmful and totally against what the movement propagates.

4.5 Slow fashion applications in other sectors and other names for the movement

Regarding comparisons and analogies made between slow fashion and other sectors of the production chain besides fashion, three areas were mentioned (Table 7), and the sector that most obtained comparisons were the food field, standing out in a large part of the literature surveyed in 40 of the 84 texts. In addition to this, only one more sector, lifestyle, was mentioned (1).

Table 7. Application in other sectors

Slow fashion in other sectors	Authors who support that idea
Food sector (51)	Johansson, 2010; Fletcher, 2010; Cataldi *et al*., 2010; Schulte *et al.*, 2012; Shephard; Pookulangara, 2013A; Pookulangara; Shephard, 2013B; Watson; Yan, 2013; Pereira; Nogueira, 2013; Tobeck, 2013; Langdown 2014; Ertekin; Atik, 2014; Schulte *et al.*, 2014; Trejo, 2014; Ramirez, 2014; Søderlund; Berg, 2015; Lee; Ahn, 2015; Chen, 2015; Valente, 2015; Henninger, 2015; Leslie, 2015; Ferronato; Franzato, 2015A; Clark, 2015; Ferronato; Franzato, 2015B; Silva; Busarello, 2016; Nishimura; Gontijo, 2016; Mardell, 2017; Zilinskaite, 2017; Duiveman, 2017; Preuit; Yan, 2017; Risso *et*

	al., 2017; Diggele, 2017; Filipe *et al.*, 2017; Santos *et al.*, 2017; Fiorin *et al.*, 2017; Fiorin, 2017; Kerner, 2018; Gupta, 2018; Cunha, 2018; Stefko; Steffek, 2018; Macena *et al.*, 2018; Sobreira *et al.*, 2018; Clark, 2019; Trejo *et al.*, 2019; Sunga; Woob, 2019; Brewer, 2019; Nishimura; Schulte; Gontijo, 2019; Garcia; Helena, 2019; Castro; Martins; Ferreira, 2019; Sapper, 2019; Vaz, 2019; Thompson, 2019.
Lifestyle (3)	Conti e Figueiredo, 2017; Sapper, 2019; Thompson, 2019.

Byun and Sternquist (2008), as well as Fletcher (2010), present fast-fashion as originating from fast food practices, in search of meeting the needs of consumers in real-time, and in counterpart to this accelerated model, slow fashion sets its characteristics, the connection between slow fashion and slow food, this explains the great relationship that exists between the food sector and the area discussed. Still, as shown in the table above, the vast majority of articles suggest the food sector as an alternative area to slow fashion, this comes as a result of the work suggesting slow food as responsible for the emergence of the slow fashion movement.

> The concept of slow fashion is inspired by the slow food movement, which began in Italy in 1986 as a reaction to the fast food culture. This movement encourages consumers to choose local, healthier food made through slow, natural processing methods, which help sustain both local economies and the environment (e.g., Slowfood.com). Similar to the slow food movement, slow fashion emphasizes the importance of the quality of fashion apparel products which is made with natural, durable materials, thus enabling consumers to wear clothes for a longer period of time and minimizing the environmental and social impact of apparel production (Sung and Woo, 2019, p. 121).

As for the lifestyle, slow fashion appears as a way of living sustainably and ethically, maintaining a slow and conscious consumption rhythm, thus, something that is beyond industrial interests; it also stands out within this idea the habit of living in a way that is not so busy, valuing oneself to the detriment of the demands of the social environment. Concerning production, slow fashion has emerged as a means of decelerating, where it seeks to reduce production cycles, thus ensuring that quality is placed above quantity. Despite areas with different focuses, the idea that is explored in common is the centralization in the development and more careful and conscious experience, pillars of the slow fashion movement, understanding that any action that is involved, affects the external environment.

The same subject may be perceived by different authors in different ways, so there is a possibility that different names are given to the same movement. Through this, we sought to catalog other terminologies that slow fashion received in the analyzed scientific works. For other names in the area (Table 8), sustainable fashion was the one that most applied to the slow fashion movement. In many inquiries that occurred during this study, sustainability was a target that expressed itself as an indispensable contributor to this compound, which is why the denomination 'Sustainable Fashion' appeared in 10 of the 84 works.

Table 8. Other names for slow fashion

Other names	Authors who support that idea
Sustainability fashion	Garg; Hada, 2014; Lee; Ahn, 2015; Henninger, 2015; Pookulangara *et al*., 2016; Henninger *et al.*, 2016; Preuit; Yan, 2017; Diggele, 2017; Candan et al., 2017; Zilinskaite, 2017; Duiveman, 2017.
Slow design	Refosco *et al.*, 2011; Kerner, 2018.
Slow clothing	Thompson, 2019.

As long as the sectors aim to slow down their production processes, allied to environmental and ethical awareness, the slow movement is gaining space and becoming increasingly widespread as a business model that can be replicated by different companies, such as its expansion into the food and productive sector, or as a lifestyle. In addition to companies, society points out as an important cut in the vision of fashion along a sustainable axis, where consumption moves towards more conscious views, that is why the exploration of the nomenclature 'sustainable fashion', for more assertive discourse.

However, literature sees slow fashion as one of the ramifications of the concept of sustainable fashion. Thus, the non-appearance of denominations such as eco-design, green fashion, or other nomenclatures in this sense, stems from the explanations brought by Nishimura, Schulte, and Gontijo (2019), which attributes a dependence on use as related to the focus of the project or process to be developed.

> a) Eco Chic: a concept that suggests elegance and respect for socio-environmental principles; b) Ethical Fashion: a concept that considers the socio-environmental impact in the fashion production chain; c) Eco-Fashion (Ecological Fashion or Green Fashion): a concept that aims to reduce environmental impacts from a conscious production process and during the product's life cycle; d) Zero Waste Fashion: a concept that seeks production that does not generate waste and waste; e) Upcycling: trend that aims to reduce waste by reusing discarded materials; f) Slow fashion: a movement that works with the idea of a productive chain of a product with a sustainable profile (Chiapetta, 2016 *apud* Nishimura, Schulte and Gontijo, 2019, p. 65, translated by us).

Thus, slow fashion is seen as a fragment of this greater dynamic than would be fashion with sustainable, ethical, and fair bias. Therefore, the use and appearance of the slow fashion nomenclature result from a specific focus and justification, depending on what the authors seek to discuss in each research. So, the scarcity of other terminologies stems from the assertive, coherent, and cohesive use of the term.

5. Conclusion and final considerations

Resuming the idea that fashion can always be renewed, as long as its conditions fit into measures that absorb socio-cultural, ecological, and sustainable benefits, it is recognized that these varieties of practices seek to limit the wear and tear of natural resources and give meaning to debates focused on for its production (Fletcher, 2010). Contemporary fashion has the power to awaken the desire for consumption,

and more than that, it has the power to dictate behaviors so that these actions are more intensified in a proportion that does not measure time and space. Through the flow of information, fashion becomes easily accessible on a global scale. Obtaining clothing items, in addition to being necessary, is now rampant amid the dynamics of fast-fashion.

The resources extracted from nature for the manufacture of fashion articles are increasingly scarce, and even so, the waste for disposal after their production comprises a vast layer that further damage the natural ecosystem. The fast current that fashion is transiting today and the quick access to information generated in networks of connections favor the frequent consumption of low-quality fashion articles, making their disposal as fast as their acquisition.

In response to this dynamic of current fashion, slow fashion came about with the assumption of inhibiting the speed of how fashion products reach the final consumer, and in such a short time they are discarded. This system is used to segment and differentiate the parts produced in a model where the form of growth is gradual and spontaneous; to offer a new marketing attribute on products and brands that have extended their useful life, durable pieces, with classic design and endowed with sustainable values (Fletcher 2016).

To this end, it sought to determine, through a systematic review, how studies in the area of slow fashion are found, precisely because the development of this research is necessary for the dissemination of knowledge that is still little disseminated about the movement but with relevant characteristics and speeches. that show a new horizon for the fashion market. It is not just about seeing fashion as a new source of profit based on the creative economy. Many of the approaches consist of understanding the emotional ties and well-being that are most deeply related to sustainability (Lins and Lugli, 2017).

From this, it was found that the beginning of research in the area of slow fashion began in 2008 with Kate Fletcher and her discussions about the need for sustainable, ethical, and conscious thinking in fashion, conforming herself as the author most cited by researchers in the area in subsequent works, with a gradual increase from 2010 and consolidation in the last three years studied, specifically with a peak in the amount of research in the years 2017 and 2019. The countries that most research slow fashion is Brazil and the States United, respectively in terms of quantity, in addition to both also categorizing themselves as having a greater focus to serve as objects of study in the works, however, the United States appears in the first place, followed by Brazil.

There is a low standard of publication on specific platforms, being observed as well fragmented, deprived in several journals and congresses of the most varied areas, as a result of its multidisciplinarity, however, the journals Fashion Practice, ModaPalavra, and Sustainability were identified as more relevant in that context. The universities that most research this subject in the sense of graduate studies are those located in Sweden, with a greater focus from administration and design, being discussed more widely in master's courses.

Regarding methodological approaches, the most prominent ones are case studies and literature review, a consequence of the primary search for understanding the dynamics in which the slow fashion movement would be configured, therefore, they aimed to study companies, companies, or conceptually reviewing the principles that guide the movement. This is also in line with the most prevalent approach being the qualitative one, as it deals with social, environmental, and cultural data and visions, as the objectives that

most emerged were exploratory. Concerning the object, the first was literature research, followed closely by field research.

The term most used to refer to slow fashion is 'movement', with two possibilities as possibilities: one, its approximation with the idea of social entrepreneurship, which balances social impact actions with business profit, and, the second, by its association with the other slow movements, such as slow food, slow living, and slow cities, thus, generalizing all these areas from the movement nomenclature.

The functional areas discussed focus on the consumer market and product development, studying how people perceive movement and, in turn, how it can be applied within the creative process of fashion products. Regarding the relation of performance and differentiation objectives by which slow fashion develops its construction, the quality aspect is by far the most discussed, as the core of the principle is translated through the passage of quantity, seen in the fast- fashion, for quality. Regarding other differentiation objectives, the most cited ones referred to sustainability, ethics, and durability, which are also commented on extensively by Jung and Jin (2014) as some of the basic principles that guide the construction of products and thinking from the slow fashion movement.

Bearing in mind that no action is without negative points, the comments on slow fashion revolve around the high cost of production, in proportion to the fair payment to all involved in the process, as well as durable, comfortable and affordable raw materials. a reliable source makes the costs high and consequently, the final price of the piece will be much higher than those produced within fast-fashion. It is also worth mentioning that it was determined that the rusticity perceived as an object of value by consumers of slow fashion proved to be a negative barrier that prevents a greater spread and acceptance of sustainable, ethical, and conscious thinking by the vast majority of the public. Consumers, in a way, believe that artifacts that are produced following slow fashion thinking tend to present an anachronistic aesthetic-visual configuration.

For future research, it is relevant to identify how to modernize the semantics and visual construction of the product through the perception of value about artifacts that start from this movement, creating storytelling that sells this notion of modernity through a more effective attitude. In this same sense, Gupta, Gwozdz, and Gentry (2019) concluded in their research that the sustainable lifestyle market, in line with that propagated by slow fashion, is much more effective than the direct marketing of products that bring this thought as a goal of performance and differentiation. Still, it is mentioned for further research in the area of slow fashion, conducting surveys to understand the consumer of this type of product more assertively. We also sought to understand other sectors of application of the slow fashion concept and the food sector was more prevalent. Besides, it was identified which other names are used to refer to the area and the result was low, identifying only ethical fashion, sustainable fashion, and slow clothing. This result derives from the name itself being already widespread, not requiring a translation and fitting perfectly into the requirements proposed by the theme, representing in an assertive and marketing way.

Thus, it is considered that with this acquired knowledge, slow fashion is no longer a marketing tool to designate often artificial concepts in current fashion, but rather, a suggestion of new methods to be practiced in a way that contributes to fashion and mainly to the environment that everyone inhabits. In the future, slow fashion will make it possible for fashion to be more than fleeting trends and momentary habits, it can go hand in hand with innovations and still contribute to the conservation of a planet free from all human

devastation.

7. References

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Institutionalization of Corporate Social Responsibility Diagnosis in Companies in the Metropolitan Area of Campinas – SP, Brazil

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ABSTRACT

This article presents the institutionalization of Corporate Social Responsibility diagnosis in companies on the Metropolitan Area of Campinas – São Paulo, Brazil. The research has a qualitative approach and exploratory-descriptive objective. Data collection is documentary and descriptive data is analyzed inductively using the content analysis technique. The survey of 16 companies concludes that social actions are focused on education and income generation, concentrated on their activity area, being carried out in partnership with social institutions and volunteering actions. However, there are problems regarding the practice of volunteering, the use of non-standardized reports, and the lack of targeting actions with the SDGs. Most companies (57%) are in the intermediate stage regarding the institutionalization of CSR.

Key-words: Corporate social responsibility; institutionalization of social actions; Sustainability; Sustainability reports; Metropolitan area of Campinas.

1 INTRODUCTION

Companies are established as entities necessary for the development of society. Its action aims at profit to shareholders, job and income generation, as well as taxes, but also to act responsibly towards the community where it is established. Some companies have undoubtedly expressive economic power, as "their revenue and their value on the stock exchange exceed the GDP of dozens of countries". With this

economic importance, to think that the private sector has no influence on political decisions, the drafting of laws and the daily lives of citizens would be merely an act of naivety (Galindo, 2017).

In this context, companies are increasingly assuming complex social commitments, jointly or independently from government, often becoming essential for health implementation, education and professionalization of the surrounding societies (Carroll, 2015). As for this company-society relationship, Corporate Social Responsibility, aimed at any type of company, is responsible for bringing companies closer to the public with which they relate (Azim, 2016). There is no question about the importance of CSR for society, but Schroeder and Schroeder (2004) defend the delimitation of Corporate Social Responsibility actions. The author concern is that the actions carried out by companies lead society to legitimize them as the main ordering and providers of the common well, with the possibility of reversing the social development of the government responsibility, replacing it with business objectives.

With these assumptions, making a diagnosis of the institutionalization of Corporate Social Responsibility in companies on the Metropolitan Area of Campinas (MAC), an area with huge companies concentration to national improvement, is the objective of this article. The diagnosis is relevant because it focusses on business strategies regarding the promotion of local development and possible minimization of social problems by social actions carried out by companies. The diagnosis may be of interest to several social actors, such as: business administrators, to better understand what CSR is and how the company should act on this matter; shareholders, to understand how their companies are committed to social responsibility; governments, to better understand the social areas in which companies operate; general public, to find out how companies act in terms of social responsibility in the MAC.

2 THEORETICAL FRAMEWORK

2.1 Corporate social responsibility (CSR): definitions and history

Focused on any type of company, Corporate Social Responsibility is responsible for bringing companies closer to the public with which they relate, known as stakeholders. In a simple way, stakeholders can be defined as any individual, group or entity that can affect or be affected by the activities of an organization (Baraibar-Diez & Sotorrio, 2018). In the 1960s, Robert Freeman's stakeholder theory stated that the existence and success, as well as the functioning and survival of organizations, depends directly on their ability to integrate the expectations of these audiences into their business strategy (Moraes et al., 2017).

Bertoncello and Chang Júnior (2007), understand that the relationship between companies and society is based on a social contract that evolves according to social changes and society's expectations. For these authors, in this contract, society legitimizes the company's existence, recognizing its activities and obligations, as well as establishing legal limits for its performance. They reinforce that society has the right to change its business expectations as an instrument of society itself (Bertoncello & Chang Júnior, 2007). Sousa (2011) adds in this scenario, the possibility that institutions that remain similar for long periods of time, can also be questioned at any time.

Regarding its history, the idea of social responsibility was born in the late 19th and early 20th centuries, but it became popular in the 1970s in Europe, particularly in France, Germany and England, with the United States being the first to bring this concept among the countries of the American continent. In

Brazil, the first manifestations on this theme took place in the late 1970s and early 1980s (Vieira, 2008).

Especially during the 20th century, under the classic economy disclosed by Milton Friedman, it was accepted that the company's only social responsibility was to generate profits and wealth for its shareholders, with economic performance as the social responsibility. In other words, a company that did not show a profit was socially irresponsible (Formentini, 2004). Guided by this concept and by self-interest, successful companies in the 19th and 20th centuries were born under the market paradigm, establishing themselves as the most efficient and effective way to obtain a stable society - "I generate profit, therefore, I fulfill my social role". However, with a focus only on profit, the real social condition is in the background, which deconstructs the relationship between market, company and improvement of human conditions (Schroeder & Schroeder, 2004).

In this context, the State starts to act as a great source of social welfare, but this is of low quality due to lack of financial resources, not fully meeting the demands of society. This scenario generated a crisis of confidence in the State's capacity, which required the search for new alternatives (Schroeder & Schroeder, 2004). This change in the role of the State arrived in Brazil in the 1990s, with the substitution of the universalist logic and the guarantee of rights (inscribed in the 1988 Brazilian constitutional charter) with a market logic based mainly on business marketing and the flexibility of work processes (Mathis & Mathis, 2012). Mathis and Mathis (2012) emphasize that this change in the responsibility of the State, for the well-being of all, was present in the proposal for State reform in the 1990s, since it transfers responsibility for the provision of social services to the "non-state public sectors"- the third sector.

During this period, partnerships between the State, social organizations and companies are encouraged, which reinforce the issue of ethics in their internal policies, and by carrying out CSR projects, they received exemption from tax charges. Thus, the Brazilian business community changes its vision and the form of social action, CSR appears in Brazil and companies become agents of social change, being responsible for supplying the State in its inability to meet some demands of society with quality (Mathis & Mathis, 2012). Since then, Corporate Social Responsibility has been the proposal for solving some social problems (Vasconcelos & Filho, 2008).

Because of this strategic change in the performance of the State and globalization, companies are encouraged to be increasingly closer to the public with which they relate, adding more and more value to CSR. Companies started to play a differentiated role from the traditional, being now charged as providers of goods and services for society, they are no longer just profit producers to participate and directly influence other social dimensions (Schroeder & Schroeder, 2004), which reinforces the right to change business expectations for society, according to Bertoncello and Chang Júnior (2007). Companies take advantage of this new context and question their own positioning, their social relevance, which opened space and the need for the phenomenon of Corporate Social Responsibility (Bertoncello & Chang Júnior, 2007).

An important element in this context and that emphasizes the need for organizations to adapt to the environment they are inserted in, for their survival in the market, is the new institutionalism (Bertoncello & Chang Júnior, 2007; Sousa, 2011). According to these authors, since the 1970s, rationalist approaches are no longer justified for organizational actions. With the emergence of institutional theory, the organization starts to be perceived as an organic system, which means, it is affected by the environment,

mainly through social characteristics.

In the new institutionalism, organizations perceive themselves as part of the social context to which they belong, with the external environment being recognized as an element influencing business results, imposing even some restrictions and demanding adaptations (Sousa, 2011), mainly due to criticisms directed at entrepreneurs and companies, resulting from pressures due to social problems (Ventura, 2005). According to Ventura (2005), this requirement regarding the fulfillment of social demands so that the company is well perceived by society, makes large companies transform strength into greatness, placing themselves, once again, as protagonists in this process. Thus, social responsibility starts to gain prominence and is widely debated and propagated in companies, being seen as a strategy of competitiveness (Formentini, 2004) and legitimacy (Ventura, 2005; Sousa, 2011).

Ventura (2005) shows that there is an expectation on the part of society in relation to organizations and that companies try to be aligned with this demand as a way of survival, leading new companies or those already established in the market to incorporate the new practices and procedures of CSR in search of legitimacy (Sousa, 2011). This scenario increases the interest and the need for companies to work with social marketing to increase their credibility with stakeholders and profitability in the market (Mathis & Mathis, 2012). Vasconcelos and Filho (2008) reinforce the speech of contemporary authors to professionals in the marketing area, where they must accept the obligation to give the same importance of profits to consumer satisfaction and social welfare when evaluating the performance of a company (Vasconcelos & Filho, 2008).

In Brazil, according to Rico (2004), philanthropy and assistance were not part of the Brazilian business culture. The first actions were heterogeneous, punctual, dependent and supervised by the State, they were only the provision of material or financial assistance, aimed at addressing an immediate problem, such as food, health, housing, among others. This practice, in the end, creates a relationship of domination and dependence established between those who have the power to carry out the action of social services and users (Silva, 2016). According to Araújo and Russo (2008), it was only from this century that large companies began to practice social responsibility in a more comprehensive way in Brazil, but Rico (2004) states that corporate social actions, with the expectation of participation in the country's social development, already occurred in the 1980s.

In Europe, most of the legislation related to CSR emerged in the late 1980s until early 2000. For the European Community, Mathis and Mathis (2012) highlight at least three perspectives that CSR assumes, being them: 1) perspectives on social responsibility in business; 2) perspectives of society and the state; and 3) stakeholder perspectives. The impacts of the effects of CSR are expressed in the following areas: business management, codes of conduct, management system, stakeholder engagement in activities carried out by the company, citizenship actions, encouraging the formation of volunteers inside and outside companies and social programs and projects, as well as responsibility for investments and responsibility for consumption.

In general, Mathis and Mathis (2012) state that at the international level, regarding human rights, companies should have a proactive role in their implementation and enforcement, without being given the same legal responsibility as States, which really are obligated to guarantee them, since human rights must be treated as universal rights (Mathis & Mathis, 2012).

For this work, the essence of CSR will be considered the same recognized by the Ethos Institute, a way for the company to conduct its business that makes it a partner and co-responsible for social development (ETHOS, 2013). Where the socially responsible company is one that has the capacity to listen to the interests of different parties (stakeholders such as: shareholders, employees, service providers, suppliers, consumers, community, government and the environment) and is able to incorporate them into the planning and strategies activities, seeking to meet the demands of everyone, not just a specific part (Bertoncello & Chang Júnior, 2007).

As much as the subject has been studied for decades, Vasconcelos and Filho (2008) and Jesus et al. (2008), already at the beginning of the 21st century, point out that there is still no consensus regarding the definition of social responsibility, mainly because there are no precise standards that determine when a company is acting in a socially responsible manner. Without this definition, minimal action can be considered a success in terms of social responsibility. The authors also highlight the consideration of Muhammad Yunus (2008), when realizing that there are good intentions in the concept of socially responsible company, but some business leaders end up abusing the concept to produce benefits for their own interests (Vasconcelos & Filho, 2008).

The conception of social responsibility by Mathis and Mathis is aligned with the definitions of Sen and Kliksberg (2007) when highlighting as social responsibility practices: welfare and philanthropic actions, related to legal obligations with practices not related to the company's business; actions that are related to the reputation and image of the company, disseminated through a code of conduct (or code of ethics) where moral values defended by the company prevail, not being restricted to assistance and philanthropic actions; actions related to a way of doing business, generating value for shareholders and contributing to sustainable development (Mathis & Mathis, 2012).

The search for social responsibility practices, which are not always the most efficient for the organization, can lead them to act in a homogeneous way, in search of legitimacy, which is a strength of the isomorphic mechanisms - important for the new institutionalism. Sousa (2011) defines isomorphism as a process that forces a unit in the population to look like another, or to be in the same set of environmental conditions. In a globalized world and in areas of free and open competition, organizations are called to act and / or adopt socially legitimate attitudes (socially accepted). Based on the study by Dimaggio and Powell (1983), he states that there are two isomorphic mechanisms: the competitive, resulting from market competition; and the institutional, arising from institutional restrictions, which can happen through coercive, mimetic and normative means.

For Ventura (2005), in many cases, organizations can join the movement for social responsibility, but without even questioning what this means and without truly producing relevant changes in their actions, seeking only what they intend to disclose and that is considered as differential by society, in general, and by consumers, specifically. In this environment of seeking legitimacy, Sousa (2011) quotes Fonseca (2003) to conclude that the types of isomorphism refer, in general, to the forces that would cause the homogeneity of organizations.

In a more critical view of the isomorphism process, Ventura (2005) states that organizations are responsible for creating new patterns of actions that they are able to fulfill, multiplying their forces, transforming them into quantities, since they always seek new opportunities. Considering the linearity of

mimetic isomorphism, Ventura (2005) affirms that competitors copy the practices applied by companies considered to be references in the market, researchers start to promote them by their differentials, studies are done to define and adapt to the local reality, criticism defines it as a differential for the company that adopts and disseminates it, institutionalizing it. In this way, the action becomes accepted and legitimate for future generations. In other words, even though it may be conflicting as to its efficiency, the concern of the company becomes the fulfillment of actions already instituted by large organizations, in order to achieve legitimacy (Ventura, 2005). The 2015 SEBRAE trend bulletin, highlights this practice by guiding small companies to seek "the main sustainability practices adopted by large companies, which can assist in the achievement of government stimulus" (SEBRAE, 2015, p.5).

Regarding this social relationship, Rico (2004) points out that, currently, business organizations tend to invest, preferably, in social activities related to the products and services they produce or sell. Laruccia and Cataldo (2006) highlight that in fact there are social issues excluded by the CSR, since in Brazil, most companies avoid controversial social projects, such as the issue of child prostitution or others that do not complement the company's brand (Laruccia & Cataldo, 2006). In other words, companies tend to invest in the social part, but within their comfort zone.

2.2 The institutionalization of CSR

According to a study carried out by Sousa (2011), the CSR institutionalization process can be divided into three stages: complementary, permeable and consecutive. However, these stages occur gradually, even though it is difficult to mark exactly the beginning and end of each stage. In the initial stage of CSR institutionalization, social actions are articulated considering the legal requirements and those stipulated by the speeches in favor of their implementation, even if companies do not agree with them. It would be the actions taken to avoid legal problems and damage to the image of the organizations, not being justified only by the pure and simple motivation of the companies, but not to suffer severe penalties from the other actors that make up the same environment in which they operate. Thus, different organizations, but interconnected in the same process, generally start to adopt, even if in a primary way and due to commercial relationships (usually with strong dependence), minimal social actions within their companies.

According to Sousa (2011), at this stage the actions carried out, most of the time, are philanthropic and coordinated by human resources and marketing employees, since there are no professionals hired directly for this demand. The sustainability reports, used as disclosure tools in the search for market differentiation, are also in the care of these employees. Sousa (2011) concludes that the companies in the first stage are motivated by the search for differentiation and/or the search for meeting the demands of dominant actors regarding CSR practices. Thus, the actions taken are not sufficient to give legitimacy to companies at this stage, however, their non-compliance guarantees severe penalties for organizations.

In the intermediate stage, organizations seek to solve specific problems and tend to be similar, because as the theory develops and becomes more explicit, the variation of organizational forms, consequently, according to Sousa (2011), decreases. At this stage, social actions are more structured in organizations that have been successful (gaining legitimacy) through their practices, but still without the existence of models, technologies and legitimate knowledge to act in compliance with all the specifics under the CSR. According to Sousa (2011), organizations that already favor social practices lead other

organizations to reproduce them consciously, due to the perception of the importance caused by the results achieved (gain in legitimacy). However, reproduction can also happen unconsciously, without clear purposes, resulting from the non-monitoring of routine situations or due to a lack of understanding of the current rules and routines, and also by the non-acceptance by the organizational actors.

Still on the intermediate stage, Sousa (2011) considers that, although the actions are more elaborate, they are still very similar to actions already considered legitimate, through the mimetic institutional isomorphic process. This process saves organizations time and money and brings security, which already have in successful organizations a base of what they must copy to achieve the same results. Another differential of this stage is the directing of social responsibility to a specific department, which aims to unify the ideas and consensus regarding the social policies practiced by the organization, being directly related to the company's top management. Thus, CSR becomes part of effective and routine actions by organizations in a more consolidated way than in the previous stage.

In the last stage of institutionalization, there is the professionalization of CSR, with universal references from the academic environment, professional or commercial associations (Sousa, 2011). At this stage, values and norms are continually repeated, being internalized, becoming, over time, an obligation or morally guided behavior. In other words, CSR starts to be present, in a well-structured way, assumed to be correct, within organizations, guiding their decision-making processes, and then the total institutionalization of corporate social responsibility occurs. At this stage, there is a matrix structure, with the participation of teams composed of members from different areas and functions within the organization, being chaired by one or more members of the general management (Sousa, 2011). The objective is to introduce CSR in different areas of the organization, since this is a broad dimension and needs to permeate corporate values and culture actively. Otherwise, the actions can be perceived only as a promotion and advertising maneuver, devaluing all the work done by the teams involved in the search for legitimate actions (Sousa, 2011).

According to Sousa (2011), maturity at this stage is capable of imposing even a correct posture, not only on the company, but also on its stakeholders, which includes the State itself. The principles of CSR are assimilated and consolidated by all those involved, which can permeate the entire economic part of a country, even guiding public policies, going beyond isolated business initiatives.

Sousa (2011) also presents a mapping of dimensions and social variables regarding CSR, which are divided into internal and external. This research focuses on external CSR, which is defined as the dimension "aimed at the development of corporate social actions that benefit the community, as well as focusing on the care for its relationships and partnerships" (Sousa, 2011, p. 171). According to Sousa (2011), the variables that make up the external social dimension are: social projects and actions; involvement with social actions; relationship with stakeholders; sustainability report; alliances/partnerships.

As a way to facilitate the criteria for differentiating each stage of CSR institutionalization, after a bibliographic review, Sousa (2011, p. 108) created a matrix in which each social variable (internal and external) is broken down considering the institutionalization stage (initial, intermediate or institutionalized). The matrix was developed based on the social and environmental dimensions that make up CSR and its most privileged variables, selected from the most legitimate reports and indexes in Europe and Brazil (DJSI - Dow Jones Sustainability Index, 2005; ISE - Index of Corporate Sustainability, 2005; GRI Report -

Sustainability Reporting Guidelines, 2006, 2008; Ibase Social Balance, 2008; Ethos Social Responsibility Indicators, 2009).

2.3 Ethics and CSR

Rico (2004) points out that Corporate Social Responsibility is associated with two factors, which go side by side, and define the essence of its practice: ethics and transparency in business management. This author reports that in this sense, "being ethical in business" assumes that the decisions of interest to a certain company respect the rights, values and interests of all individuals who, in some way, are affected by it (Rico, 2004). "Being transparent" means meeting social expectations, maintaining consistency between discourse and practice and not withholding important information about their goods and services.

Still on ethics, Jesus et al. (2017, p.7) defines it as "an exercise of freedom impossible to be imposed and that, in the company, corresponds to the sum of the ethics of all employees". An interesting point made by these authors, already commented by Ometto et al. (2015), is that ethics is a human value, and both companies and stakeholders are composed of individuals. It is evident that, for these authors, if the company does not meet the needs and expectations of its stakeholders, depending on the profile of the society in which this company is inserted, it can be questioned and contradicted (Jesus et al., 2017), running the risk of failure (Vieira, 2008) and even of having to close its operations (Vasconcelos & Filho, 2008).

Therefore, individual actions matter, as a company is led and made up of people. If the Ethos Institute and the Brazilian Business Council for Sustainable Development (CEBDS) - a branch of the World Business Council for Sustainable Development (WBCSD), are composed of companies and groups of great economic power, it is because CSR is strategic and the different audiences with whom companies interact expect this commitment, but mainly because strategic people had to make this decision. After all, according to Ometto et al. (2015), it is the individual, the agent, the person, the subject who transmits and modifies social practices.

However, according to Galbraith (2004), there are several innocent frauds regarding companies, their leadership and ethics. One of the innocent frauds presented by this author relates the ethics of companies and the relationship with their consumers, since the statement: who makes the market is the consumer, is a fraud. For this author, one of the most widespread forms of fraud is to believe in a market economy where the consumer is sovereign, in addition to the illusion of making a sale without managing and controlling the consumer (Galbraith, 2004).

Also, according to Galbraith (2004), the most sophisticated and most evident form of fraud is the illusion of business administration. As much as there is an impression of authority for business owners, it does not really exist - a fraud, said by the author, as accepted. Power, in the big modern company, is actually in the hands of executives. For Galbraith (2004), the board of directors is just a lovely entity, which meets with indulgence and brotherly respect, but which is entirely subordinate to the real power of the administrators. All decisions are already made by the real owners of the business and the decision-making meetings are a mere formality, as well as the false choice of the consumer. In this scenario, the people who really have the power and know the decisions that will be made (mainly in the American context) are the administrators (Galbraith, 2004).

Regarding ethics in business leadership, for Laruccia and Cataldo (2006), in logical terms, there can

be three types of categories of entrepreneurs in relation to CSR: which states that social responsibility is not part of their business; the one who does the good deed but in the wrong way (hires, for example, a disabled person, but does not even think about what activity the person will perform and what space he/she will occupy in the company); and the one that really understood the concept (Laruccia & Cataldo, 2006).

In the midst of these questions and pointing out false morals (fraud) of some companies, it is clear the importance of CSR, as well as the ethical and critical sense of stakeholders and the need for companies to be transparent in their actions in relation to CSR. The ethical behavior and social responsibility of organizations are among the most important trends that influence management's actions at the beginning of the third millennium. Even though the debate on ethics and social responsibility is old, it is currently accentuated by problems such as corruption, consumer protection, unemployment, pollution, among many others that involve public or private organizations and social behaviors of business leaders (Laruccia & Cataldo, 2006).

Due to this growing importance, some communication tools were created by companies to make their social actions public, such as: social report, reports, awards, certifications, audits, among others. Regarding these channels, Mathis and Mathis (2012) and Rico (2004) highlight the social balance as the most important, as it is able to show the level of corporate social responsibility and still be accountable to society for the use of public assets (Vieira, 2008). Because it is not mandatory, it is through the social report that companies transmit their commitments and conduct of social responsibility, disseminating the link between ethics and the production process (Rico, 2004), which is an option for companies to communicate transparently with the public which they relate.

Still on social communication, the Brazilian Institute of Social Analysis (ibase) and the Global Reporting Initiative (GRI), stand out for the development of standards for preparing sustainability reports, as well as the certification of publications (Mathis & Mathis, 2012). Due to the current importance of CSR, Sen and Klilsberg (2007) state that the GRI itself questions whether the time has come for the rendering of accounts of economic, environmental and social data of companies to stop being voluntary and become mandatory (scenario already existing in Sweden and Denmark) (Sen & Kliksberg, 2007). Vieira (2008), on the other hand, presents arguments against the mandatory publication of corporate social actions for facing the fundamental principle of the liberal spirit that regulates social relations. It suggests that the regulation of the Social Balance Sheet in Brazil should follow models from other countries, such as the United States, Germany, Holland, England and Belgium, where the publication of the Social Balance Sheet is an integral part of the companies' strategic process. Without the compulsory publication, companies expose to society their positive and negative impacts caused by their business, which demonstrates, at least, responsibility. According to Sousa (2011), this may actually be a behavior related to the degree of institutionalism regarding CSR, where smaller companies copy the practices of companies considered “references” in the market to legitimize themselves. The fact is, regardless of whether it is mandatory or optional, the Social Balance became part of the strategic thinking of companies (Vieira, 2008).

As a support for companies committed to their social actions, the Ethos Institute of Business and Social Responsibility was created in the 1990s with the mission of mobilizing, raising awareness and helping companies to manage their businesses in a socially responsible manner, dealing with topics such as: values, transparency and governance, internal public, environment, suppliers, consumers/customers,

community/government and society (Mathis & Mathis, 2012). Rico (2004) also highlights the importance of the Group of Institutes, Foundations and Companies - GIFE, for being the first business association founded in Brazil, and also the first in South America, created in 1995, which brings together organizations of private capital that finance or carry out social, environmental and cultural projects of public interest.

For Sen and Kliksberg (2007), CSR will be the new way of doing business. They emphasize that civil society has demanded this evolution for being more organized, more informed and participatory (Sen & Kliksberg, 2007).

2.4 CSR and its limits

The socially responsible company, according to Sousa Filho et al. (2010), achieves a great competitive advantage in relation to the others, since it proposes to assimilate co-responsibility in facing inequality and social exclusion.

As already seen in previous topics, because Brazilian economic policy was turned to economic stability decades ago, and because it stopped investing in social programs, there was an increase in social inequalities, triggered by an unprecedented socio-political-economic crisis in the Brazilian society. With the concept of the Minimum State, there is a consequent retraction of investments in public and social policies, decentralization of social projects and the privatization of some basic social services, creating an opportunity for civil society organizations and institutions and business foundations to work together to the social issue. These entities are beginning to look for ways to reduce poverty and strengthen democracy in underdeveloped societies (Rico, 2004).

It can also be said that partnerships are now understood as fundamental in tackling social exclusion, insofar as they can aggregate innovative experiences that serve as a reference for the elaboration of social policies, but that it is not forgotten that the elaboration and implementation of policies social responsibilities are the responsibility of the State (Rico, 2004). Currently, private social investment is necessary due to the numerous and varied problems that societies face. Rico (2004) points out that this investment is also the result of the company's ethical relationship with its employees, its suppliers, the government, its customers (stakeholders) and the environment, all of which are directly or indirectly impacted by the inefficiency of the State (Rico, 2004). The great tendency is that companies contribute to public policies, but not to suffocate or replace them, but to develop them (GVCES, 2018).

Health care, education and transportation programs for employees, service to the public and the community, environmental protection, consumer protection, urban development and renovation, culture, art and recreation, can be mentioned as examples of actions that companies take, but that should be guaranteed by the State. These programs have become increasingly varied and complex, promoting even a transformation in the way companies conduct their business, due to the variety of structural problems in Brazil, such as hunger, violence, diseases, lack of formal education, among others (Schroeder & Schroeder, 2004).

According to Schroeder and Schroeder (2004), as companies are major centers of economic and political power, and directly interfere in social dynamics, when assuming social causes, companies would be giving back to society part of the human, natural, financial resources they consume to develop their activities. For many social actors, this situation legitimizes corporate social responsibility. For others, the

advancement of the power of companies in society goes far beyond their traditional responsibilities, as a supplier of goods and services to the responsibility of social welfare, asserting itself as a propagator and guarantor of the common good.

In other words, in addition to providing society with goods and services, the company has the citizen's well-being under its control (Schroeder & Schroeder, 2004), since the company takes matters into its own hands, which have always been the responsibility of others organizational systems that become peripheral. At the same time, companies are increasingly self-sufficient, becoming the most important institutions in the contemporary world (with financial results greater than the GDP of many countries) and have transformed human life in its most intimate aspect (Schroeder & Schroeder, 2004).

In addition to these deviations from objectives and public quality bonds, the investments made by RSC reach strategic portions of the population, selected according to criteria established by the foundations themselves, business institutes and partner organizations. According to Rico (2004), this is a contradictory issue (as the business community has its own interests, such as competitive advantage, visibility and image dissemination) that puts the philosophy and principles of corporate social responsibility in check. Social services should not, but end up, being directed to a part of society defined based on different criteria from those of the universality of rights. The contradiction happens (because there is a previous selection of the public to be served), but social investments reveal a public commitment by the business community to face inequalities, seeking to collaborate with social development (Rico, 2004).

In view of this reality, Schroeder and Schroeder (2004) defend the idea of delimiting corporate social responsibility actions, of reevaluating the companies' influence and actions in society. There is no question as to the importance of CSR for society and it has nothing to do with the benefits already generated, but with its progress. The fear is that corporate social responsibility actions will lead society to legitimize companies as the main ordering and providers of the common good, with companies being, in fact, just another part of society, with their own specific objectives. When letting companies act in this way, there may be an inversion of the full development of human potential, replacing it with business objectives (Schroeder & Schroeder, 2004).

CSR actions, without control, can also become a way for the company to justify certain situations or impositions, both to its employees and to society in general. In addition, the community can also become quite tolerant of abuses by a company that finances social and/or environmental actions in its region, such as hospitals, cultural, ecological and social events in general. Thus, business attitudes previously said to be unacceptable by society, can begin to be accepted for the benefits brought to it. The great concern is that the company uses social actions to expand its power, both internally and externally, and that the company definitely becomes the main social actor (Schroeder & Schroeder, 2004).

As a suggestion about their limits, Sen and Kliksberg (2007) emphasize that CSR must evolve with the support of public policies, always aiming at the collective good and that narcissistic or philanthropic companies once and for all incorporate social responsibility into their business (Sen & Kliksberg, 2007). In accordance with this proposition, the Center for Sustainability Studies at Fundação Getúlio Vargas has guided companies to work with public agencies in their localities, presenting co-partnering programs (company, public sector and society) and that there always be a strategy exit for these projects, so that the projects are not unlimited, without a defined chronology, or that do not really develop that community and

the public sector (GVCES, 2018).

Sen and Kliksberg (2007) still address the issue of the formation of the top leadership of companies, pointing out that something went wrong in the formation of these business leaders, whose focus is exclusively on the financial result. But according to Galbraith (2004), this is an innocent fraud. Sen and Kliksberg (2007) prefer to reinforce that the crisis made it clear that CSR is necessary, now business leaders need to know how to undertake it (Sen & Kliksberg, 2007) and society and public authorities, to limit it.

3 METHODOLOGY

This research has a qualitative approach and an exploratory and descriptive objective (Gil, 2019; CEBRAP, 2016). Data collection is documentary with descriptive data being analyzed inductively (Creswell, 2014), with its process and meaning as the main focus of approach to content analysis (Mozzato & Grzybovski, 2011).

3.1 Research Universe

The Metropolitan Area of Campinas (MAC), created in 2000 by the State Complementary Law n°. 870/00, is the universe of this research. The MAC is formed by 20 municipalities: Americana, Artur Nogueira, Campinas, Cosmópolis, Engenheiro Coelho, Holambra, Hortolândia, Indaiatuba, Itatiba, Jaguariúna, Monte Mor, Morungaba, Nova Odessa, Paulínia, Pedreira, Santa Bárbara d'Oeste, Santo Antônio de Posse, Sumaré, Valinhos and Vinhedo. Campinas is an inland city of the State of São Paulo, just over 100 km from São Paulo (capital), has more than 260 years and a population with more than 1 million inhabitants. Its area is 795 km2 and includes four districts: Joaquim Egídio, Sousas, Barão Geraldo and Nova Aparecida (IBGE, 2018).

The MAC is the second largest metropolitan area of the State of São Paulo in population, with more than 3.1 million inhabitants, according to an estimate by the Brazilian Institute of Geography and Statistics (IBGE) for 2016, and generates 8.5% of the State Gross Domestic Product (GDP) (EMPLASA, 2018). According to EMPLASA (2018), the MAC comprises a modern, diversified industrial park composed of companies from different areas of activity. It has a very significant agricultural and agroindustrial structure and performs expressive specialization tertiary activities. It is also noteworthy for the presence of innovative centers in the scientific area and technological research, as well as the Viracopos Airport, located on Campinas, the second largest airport in the country in cargo transportation. Another highlight is the concentration of huge multinational companies (OMI, 2014a) and the presence of large industrial and business hubs, such as CIATEC, and scientific ones, such as the National Synchrotron Laboratory (OMI, 2014b).

3.2 Survey sampling

In the process of choosing companies, MAC companies were mapped through the report prepared by the Metropolitan Observatory - MAC Indicators (IMO, 2014a), with the survey of companies regarding export (37 companies) and imports (66 companies), and the report by the newspaper Correio Popular (Popular, 2013), where the 100 largest companies are presented considering net revenue - most recent reports that presented a degree of relevance of the companies present at MAC.

Based on these documents, a pre-selection of the companies was carried out, adopting the following criteria for choosing: (1) being part of the two documents; and (2) be a Known company in the MAC. To meet this last criterion, intentional non-probabilistic sampling was adopted. Thus, a total of 24 companies met these criteria.

3.3 Criteria for selecting companies

With the 24 pre-selected companies, four business initiatives were checked as a first direction of companies commitments to sustainability, associated with: (i) UN Global Compact, with more than 13,000 members in 160 countries, and the largest corporate sustainability initiative, which is voluntary (Pacto Global, 2019, sp); (ii) GIFE - Group of Institutes, Foundations and Companies, an association of social investors in Brazil (GIFE, 2019); (iii) ETHOS - Ethos Institute of Business and Social Responsibility, a hub for organizing knowledge, exchanging experiences and developing tools to help companies analyze their management practices and deepen their commitment to social responsibility and sustainable development (ETHOS, 2019); (iv) or CEBDS - Brazilian Business Council for Sustainable Development, a non-profit civil association that promotes sustainable development through articulation with governments and civil society and is the representative in Brazil to the World Business Council for Sustainable Development (WBCSD) (CEBDS, 2019).

The checking of the companies' adherence to the four initiatives took place by consulting the websites of each association and each company, in August 2019, considering only the adherence of companies established in Brazil, which also includes adherence by their institutes or business foundations.

Another criterion considered was the availability of sustainability reports, considering only the years of 2017 or 2018, on websites/homepages (in general), since the research had as its initial objective the exclusive use of sustainability reports as a documentary base. However, during the search for information, it was evident the existence of a varied scenario regarding the commitment of MAC companies to sustainability, as well as the dissemination of information. This situation was the reality for this research, so it needed to adjust the criteria selection. Thus, the research analyzed 16 companies, considering four scenarios, as presented in Table 1.

1. COMPANIES THAT HAVE JOINED ANY BUSINESS INITIATIVE AND HAVE SHARED SUSTAINABILITY REPORTS		
Company	Nationality	Search base
Ambev S/A	Brazilian	2018 GRI Report
Braskem	Brazilian	2018 GRI Report
CPFL	Brazilian/Chinese	2018 GRI Report
SANASA	Brazilian	2017 GRI Report
Syngenta	Swiss	2018 GRI Report In English/Worldwide
Unimed	Brazilian	2018 GRI Report
2. COMPANIES THAT HAVE JOINED ANY BUSINESS INITIATIVE, DOES NOT HAVE A SUSTAINABILITY REPORT, BUT HAS INFORMATION ON THE WEBSITE		

Company	Nationality	Search base
DPaschoal	Brazilian	Website
Elektro Redes S/A	Brazilian	Website
3. COMPANIES THAT HAVE NOT ADHERED TO ANY BUSINESS INITIATIVE, BUT HAVE A SUSTAINABILITY REPORT		
Company	Nationality	Search base
Bosch	German	2017 GRI Report In English/Worldwide
Goodyear	American	2018 GRI Report In English/Worldwide
Rhodia Grupo Solvay	French/Belgian	2018 GRI Report In English/Worldwide
Tetra Pak	Swedish	2018 Report Not GRI In English/Worldwide
Unilever	British/Netherlands	2017 Report Not GRI
4. COMPANIES THAT HAVE NOT ADHERED TO ANY BUSINESS INITIATIVE, DO NOT HAVE SUSTAINABILITY REPORT, BUT HAVE INFORMATION ON THE WEBSITE		
Company	Nationality	Search base
Eaton	American	Website
E M S	Brazilian	Website
Rota das Bandeiras	Brazilian	Website

Table 1. List of companies analyzed by type of scenario.

Source: elaborated by the authors, based on the research data.

The results reveal that out of the initial 24 companies, eight companies, in addition to not joining any of the four business initiatives for sustainability, also do not have shared sustainability reports and/or information on their websites, and it is not possible, in any way, analyze them.

3.3 Data collection technique

The documents considered valid for this research are the sustainability reports (not necessarily the GRI), or the websites of the selected companies.

3.4 Data analysis and interpretation

Content analysis is a data analysis technique that is frequently used in qualitative research, it is relevant to organizational studies, it is used in the administration area in Brazil (Mozzato & Grzybovski, 2011) and it is applied in this research.

4 ANALYSIS AND DISCUSSION OF RESULTS

To make the diagnosis, six categories of analysis were determined: Category 1. Link between social action and the company's area of activity; Category 2. Social problem related to actions taken by companies; Category 3. Establishment of partnerships to promote CSR; Category 4. Targeting Sustainable Development Goals; Category 5. Stage of institutionalization of CSR; Category 6. Awards.

As for the material analyzed, 69% are sustainability reports, 73% of which are from 2018 and 82% are GRI. The websites, less stable sources, represented 31% of the analyzed materials. Thus, the main research database can be considered updated and from well-established sources.

Out of the sustainability reports analyzed, 38% are from companies that have adhered to any of the four business initiatives for sustainability. This scenario being the minority, there is no indication of correlation between companies adhering to any of the initiatives and sharing sustainability data externally through sustainability reports, which, in principle, was expected.

Also, for the sustainability reports analyzed, 45% are in English, exclusively from multinationals, with presents global data. Considering that these multinational companies operate in Brazil and access to other languages is not the reality of a large part of the population, the public report becomes extremely restricted, which directs the communication position of the companies with their stakeholders, being able to exclude even its employees. Another relevant point in these multinationals reports, is to present the company globally, and loss the clarity of the actions taken.

These results demonstrate that some companies still need to bring more clearly and transparently the actions performed and the results achieved, so there is no questioning about ethics and corporate social responsibility, or even the social behavior of business leaders (Laruccia & Cataldo, 2006).

In general, some analyzed materials did not correspond to the expectations of the research, since a lot of information was generalist, which does not allow a strong and in-depth analysis on this subject. Following are the analyzes made from the created categories:

Category 1. Link between social action and the company's area

It is possible to affirm that all companies have at least one action that is directly or indirectly related to their area. This result reinforces the affirmations of Rico (2004) and Laruccia and Cataldo (2006), regarding the tendency of companies to invest, preferably, in social actions related to their business.

Category 2. Social problem related to actions taken by companies

With actions carried out directly, either through their own resources, by their Institutes or Foundations, or by volunteering, half of the companies analyzed have initiatives with the common objective of promoting education in communities located in areas of social vulnerability. These actions are not always related to the company's area of activity, focusing on ensuring basic education (elementary and high school). Among these companies, Ambev, DPaschoal, Elektro and EMS present actions aimed to the training and education of those responsible for the management of NGOs or local teachers.

Some companies have programs aimed at training for income generation, since many of the initiatives presented as educational, end up promoting, through the application of professional technical courses,

access to the labor market. In some cases, at the end of the course, young students may be selected to work in the company that provides the course. Thus, these were the two main focuses of action of the social actions found in the analyzed materials: education and income generation.

The other social problems related to business actions were: access to drinking water; basic sanitation; actions for the conscious consumption of energy and energy efficiency - in these specific cases, directly related to the business sector of the companies; regarding conscious consumption - in these cases, mainly the correct disposal of waste or access to infant food. Chart 1 shows the proportion of social problems related to business actions.

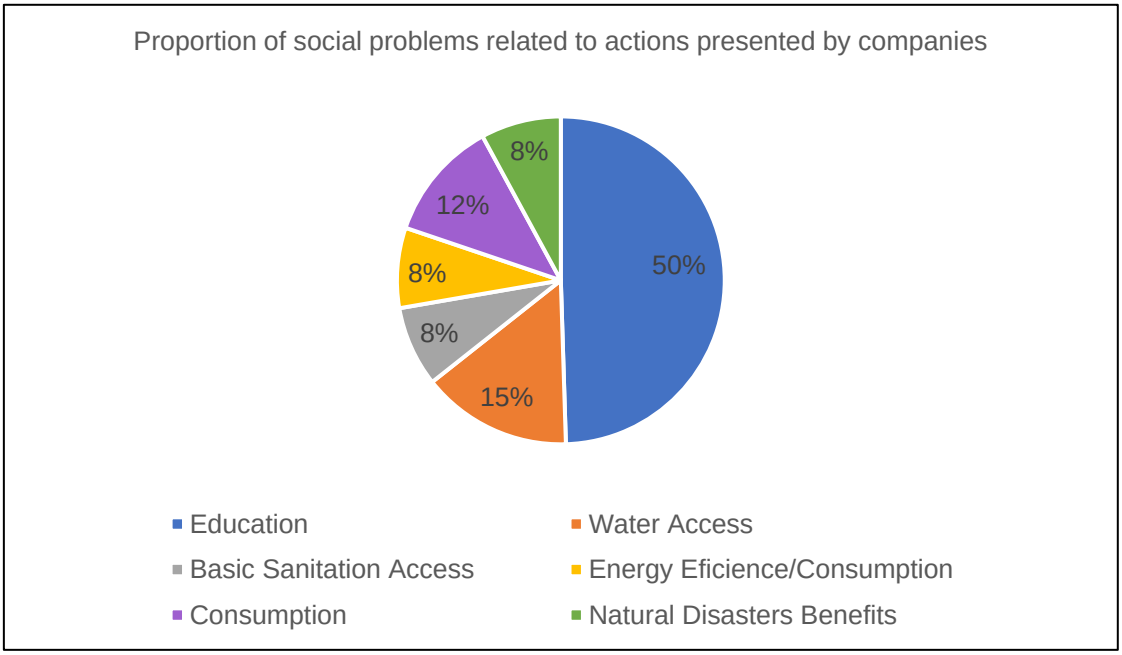

Chart 2. Proportion of social problems related to actions presented by companies.

Source: elaborated by the authors, based on the research data.

These social responsibility actions are aligned with the work of Rico (2004), since this author emphasizes the search of companies, as well as their foundations or institutes, in finding ways to reduce poverty and strengthen democracy in underdeveloped societies. At the same time, these results reinforce the statements of this same author, as well as Laruccia and Cataldo (2006), regarding the tendency of companies to avoid controversial social themes, while remaining in a comfort zone.

Category 3. Establishment of partnerships to promote CSR

Generally or directly, all the companies analyzed reinforce the importance of establishing partnerships with third sector organizations, educational institutions are also highlighted by some companies, and show the importance of a good relationship with public organizations (city halls, public agencies, schools, among others) to promote social development. With these practices presented, companies act against the statement of GVCES (2018), where the great tendency is that companies contribute to public policies, not to suffocate or replace them, but to develop them.

However, the analyzed actions refer again to Rico study (2004), who warns about the execution of

corporate social actions for strategic population segments, selected by criteria established by the foundations or business institutes themselves, together with partner organizations. This author states that this scenario does not necessarily favor the population that most demands the action that is being carried out, but the most strategic for the company.

Another point that reinforces the questioning regarding the relationship of need and the target audience, are the corporate volunteering actions. Half of the companies have well-structured volunteering activities, where their employees share knowledge with students or professionals from schools or third sector organizations, or work directly in local communities, being previously aligned with the needs of that location. It is worth highlighting that some of these same companies also have extremely punctual and assistance-oriented volunteer actions.

This result, in addition to the lack of purpose regarding CSR, shows that some companies in the MAC still with the same stance as the first corporate social actions in Brazil, characterized as actions only to provide material or financial assistance, in order to address an immediate problem, such as food, health, housing, among others. According to Rico (2004), this practice creates a relationship of domination and dependence between the company and the users.

Out of the companies that presented voluntary actions, all multinationals refer to specific dates of joint actions, with the aim of engaging all their units, but with vague information. Among the companies analyzed, 38% of the companies represent those who did not clearly mention volunteering actions.

Still regarding volunteering, an important point stands out: the deviations regarding the concept of corporate volunteering and social actions carried out by employees. This difficulty in the business world has already been presented in the work of Irigaray et al. (2017). Among the materials analyzed, there is an example that drew attention because it presents a program in which employees from international units donate their vacation days to practice volunteering actions in Brazil, and corporate volunteering actions must take place during employees' working hours, and not on vacation or free time (Irigaray et al., 2017).

The other problem found is in a business report with practices that presented raise questions about the responsibility for the action, whether the employee acts as a company volunteer or as an individual. For example, the donation of employees of at least R$ 1.00 deducted directly from payroll to reform social institutions, defined by the company. According to the description, who promotes the action is the resource donated by the employee and not by the company. Another question arises about the blood donation by employees, since this company does not make it clear whether the blood donation, carried out by registering employees in the donor bank, is a corporate volunteering action (with the donation being made on office hours) or not.

Another issue that drew attention, both in reports and on websites, is the lack of clarity in the presentation of projects carried out by tax incentive laws. The practice of tax allocation for social actions is carried out by several companies, according to current legislation, but companies bring this practice to the attention of the reader in a very vague way. In the descriptions of social projects, it is not clear whether they are carried out with the company's own resources or through the use of incentive laws. This point should have more importance and clarity, since projects encouraged are nothing more than directing taxes due to pre-selected social projects by companies. Since tax money is public, this targeting of public resources should be clearer in all materials analyzed.

In general, the analyzed projects do not occur exclusively close to the company's installation areas, extending to the areas where its stakeholders operate. These cases appeared mainly in the global reports of multinational companies. Another differential found in the global reports of two multinational companies, is the presentation of humanitarian initiatives for natural disasters, which can include even their employees.

This relationship with the place where social actions operate is aligned with the studies by Vasconcelos and Filho (2008). These authors indicate that companies are committed to acting, with social actions, in accordance with local needs. However, according to Schroeder and Schroeder (2004), this targeting of the public served by corporate social actions can lead communities to reveal and accept actions of negative impact, for receiving such benefits, being social actions a way for the company to expand its local power and even become the main social actor.

Category 4. Targeting Sustainable Development Goals

As for the presentation of the activities carried out by the companies and the direction towards the Sustainable Development Goals (SDGs), many companies need to take a position, since 44% of the companies did not present any reference to the SDGs in the analyzed material. An interesting point found is about a company that is a signatory to the Global Compact, which reinforces this initiative in its report, but makes no reference to the SDGs in its projects. Since the Global Compact works directly with the SDGs, this direction is expected.

Another point that drew attention was the fact that a company that is a signatory to the Global Compact does not present this information on its website, neither promote the targeting of the SDGs in their activities or actions. Another company, this time associated with GIFE, also does not have this initiative on its website, nor its relationship with the SDGs.

As for the companies that refer to the SDGs in the analyzed materials (56%), there are companies that have joined any of the business initiatives, creating the expectation of finding the company's direction for the SDGs (5 companies), and those that have not adhered to no initiative, but have a direction with the SDGs, exceeding expectations (4 companies). These companies can also be divided into 2 groups: 4 companies that present the relationship in a more general way, relating the SDGs only to the business sector of the company (Ambev, SANASA, Rhodia and Tetra Pak); and 5 companies that present the relationship in a more specific way, connecting the SDGs to the company's area of activity, as well as to the projects and social actions carried out (Braskem, CPFL, Syngenta, Bosch and Goodyear).

Category 5. CSR institutionalization stage

CSR institutionalization stage, for the variables of the external social dimension, following the work of Sousa (2011, p. 108), the variable "alliances/partnerships" was not considered due to the lack of quality in the analyzed material. For all percentage calculations, only companies that presented materials that could be analyzed for that social dimension were considered, according to Sousa (2011, p. 108).

The company Eaton was the only company disregarded for this category due to the fact that the information presented on the website, at the time of the research, was extremely generic.

As for the variable “projects and external actions” for the 15 other companies, 53% have an intermediate stage, 47% are institutionalized, and no business action was an initial stage. For this variable,

the result demonstrates that the projects and social actions carried out by the analyzed companies are not sporadic and philanthropic, not happening only when there is an external request, thus there is a concern of the company with the impact created by its activities in the MAC. The actions are carried out in partnership with local institutions and are part of the business of some companies.

As for the variable "involvement with social actions", in addition to Eaton, Unilever also did not provide enough information to evaluate this variable. Thus, from the 14 companies analyzed, 28.5% have an initial stage, 43% intermediate stage and 28.5% institutionalized stage. This result shows that at MAC there are few companies with well-defined volunteer programs that work together with social institutions to improve social development, sharing the knowledge of their employees, in addition to their own technologies and equipment. There is also a lack of synergy between companies and their suppliers to promote more effective actions in social projects, since only 4 companies (29%) have an institutionalized stage for this variable. Similar to this study, the research carried out by Milani Filho (2008) also revealed that several companies that propagate the performance of social responsibility actions do not demonstrate it in a convincing and satisfactory way to the society.

Again, Eaton and Unilever could not be evaluated in the variable "relationship with stakeholders" due to lack of information. Out of the 14 companies analyzed, 21.5% have an initial stage, their relationship with stakeholders being purely commercial, 57% intermediate stage and 21.5% institutionalized stage. With most companies in the intermediate stage, the relationship with stakeholders is no longer merely commercial, but it still needs to be improved, expanding its dialogue restricted to customers, suppliers and the government to all stakeholders, such as the local community. It is necessary for the 8 companies in the intermediate stage could be more active in communication, more transparent in their actions and be able to predict and respond in actions with negative social impacts, such as the 3 companies in institutionalized stage for this variable.

In the last external social variable analysis considered in this research, "sustainability reports", the search also considered websites. Eaton was disregarded again. As a result of the 15 companies analyzed, 40% have an initial stage, with information only on websites or in generic and vaguely reports, 47% have an intermediate stage and only 13% institutionalized stage.

In other words, many companies still need to improve the communication quality of their social actions. The big difference for reports to be considered institutionalized is the use of legitimate reporting models, such as the GRI, addressing not only positive aspects, but also negative ones (assuming their failures), and the requirement of the same commitment of social responsibility from its partners.

These results demonstrate that still no quality standard in communication and this directly impacts the information transmitted to the stakeholders of the companies. Even if the majority of the reports used by the companies analyzed are the GRI (82%), the suggestion of Sen and Klilsberg (2007), regarding the reporting of information is no longer voluntary and becomes mandatory, it could help to standardize the quality of information, making it clearer and more transparent to stakeholders. Based on the results, the companies still needing to evolve a lot to reach the level of responsibility expected by Vieira (2008), to have a higher stage in institutionalization of CSR, according to Sousa (2011), where companies expose to society their positive and negative impacts caused by their business, which demonstrates, at least, ethics and responsibility.

According to Bertoncello and Chang Júnior (2007), this result can impact the image of these companies with stakeholders, as it does not bring clear and transparent information, demonstrating a governance that is not constructed very well. According to Azim (2016), these companies may also have problems in retaining employees, since being responsible for society's needs and carrying out ethical business practices are standard expectations of employees towards companies.

As for the general institutionalization stage of CSR, considering the external social dimension, 14% of the companies are in the initial stage, 57% in the intermediate stage and 29% in the institutionalized stage (disregarding Unilever and Eaton for not having enough information in this regard). Table 2 shows the institutionalization stage of CSR in relation to the external social dimension of the companies studied.

CSR institutionalization stage (external social dimension)		
Initial	**Intermediary**	**Institutionalized**
Tetra Pak and EMS	Braskem, SANASA, Syngenta, Elektro, Bosch, Goodyear, Rhodia and Rota das Bandeiras	Ambev, CPFL, Unimed and DPaschoal

Table 2. CSR institutionalization stage.

Source: elaborated by the authors, based on the research data.

It can be seen in Table 2 that in the external social dimension there is a predominance of companies in the intermediate stage of institutionalization.

In Table 3, the detailed result regarding the institutionalization of CSR for analyzed companies is presented, relating the external social variables, the institutionalization stage and the companies, with emphasis (**in bold**) for the companies with all the variables in institutionalized stage.

Variables	**CSR institutionalization stage**		
External Social Dimension	**Initial**	**Intermediate**	**Institutionalized**
Projects and social actions	None	Braskem, SANASA, Syngenta, Unilever, Bosch, Tetra Pak, EMS and Rota das Bandeiras	Ambev, **CPFL**, **Unimed**, Dpaschoal, Elektro, Goodyear and Rhodia
Involvement with social actions	SANASA, Syngenta, Tetra Pak and EMS	Braskem, Elektro, Boch, Goodyear, Rhodia and Rota das Bandeiras	Ambev, **CPFL**, **Unimed** and Dpaschoal
Relationship with STK	Syngenta, Tetra Pak and EMS	Braskem, DPaschoal, Elektro, SANASA, Bosch, Goodyear, Rhodia and Rota das Bandeiras	Ambev, **CPFL** and **Unimed**
Sustainability Reports	DPaschoal, Elektro, Tetra Pak, Unilever, EMS and Rota das Bandeiras	Ambev, Braskem, SANASA, Syngenta, Bosch, Goodyear and Rhodia	**CPFL** and **Unimed**

Table 3. Stage of companies for each variable of the external social dimension.

Source: elaborated by the authors, based on the research data.

Based on Vieira (2008) study, it can be seen in Table 3 that, considering all the institutionalization external social variables, CPFL and Unimed can be considered companies reference in terms of social responsibility. However, considering the other items of interest to this research, Unimed has development points, such as relating the SDGs in its actions and improving its approach regarding corporate volunteering actions. As CPFL presents its actions according to the SDGs, as well as volunteering actions in a more clear and objective way, it becomes the "reference" company in terms of CSR practices in the Metropolitan Area of Campinas.

Category 6. Awards

For external recognition of sustainability practices, not being restricted to social responsibility actions, it is important to note that only four companies (25%) reported their awards, CPFL, DPaschoal, Goodyear and Unilever. The awards listed by CPFL are: SDG Brasil Award, an initiative promoted by the Federal Government that recognizes the best projects adhering to the UN SDGs, where the Emotive project received an honorable mention; and the Eco Brasil Award, where the awarded cases were the Arborização + Segura, CPFL in Schools and Living Lab projects. This result highlights CPFL's maturity in terms of their sustainability and social responsibility practices.

5 FINAL CONSIDERATIONS

This study made a diagnosis for the institutionalization of Corporate Social Responsibility in companies on the Metropolitan Area of Campinas, an area with important companies concentration responsible for the country development. It started with the assumption that companies are fundamental to the development of society and they have increasingly developed social projects in the communities of interest. The study shows that this approach to society has positive aspects, but there still have problems that need to be faced by the companies surveyed regarding CSR.

In this study, even when the analyzed projects are important and well-structured, the diagnosis shows problems regarding the realization and dissemination of projects that are not related to CSR and, even, for actions with possible promotion of dependency between the benefited community with the company (for specific and assistentialist actions), and no objective of promoting social development. Another challenge is the implementation of social actions aimed at strategic segments of the population, considering mainly business criteria. In other words, some actions presented are not necessarily aimed at the population that most demands that benefit, but at the most strategic for the company. By acting in this way, companies can reverse the full development of human potential, replacing it with business goals.

The analysis of the relations of performance of administrators and business leadership for CSR, could be researched by applying questionnaires directed at this audience, since it cannot be carried out in this research due to lack of available information. In future studies, it is possible to analyze how the performance of administrators and business leadership for CSR occurs, once this aspect was not considered in the present work.

If companies choose to follow the actions of most MAC companies to establish their social responsibility actions, in search of legitimacy and government incentives, as pointed out by Ventura (2005), Souza (2011) and SEBRAE (2015), it is assumed that companies would have as a standard actions aimed at education and income generation, in some way focused on the company's area of activity, with continuous or punctual volunteer actions. The actions should be carried out through partnerships with public agencies and the third sector, but without necessarily involving other private companies, and may also act through tax incentive laws, through the contribution of incentive projects. They should share their social information annually, not necessarily using standard sustainability reports, highlighting only successful actions, but directing their activities with the Sustainable Development Goals (SDGs). By acting in this way, companies would fit into the intermediate stage of institutionalizing corporate social responsibility, considering the external social variable. This being the business standard found for MAC (57%) through this diagnosis.

To reach the institutionalized CSR stage, companies must incorporate social practices into their business by involving their stakeholders in social actions, especially their suppliers and employees. Employees can be involved through corporate volunteering actions in a structured way, with the purpose of local social development, clearly relating all their activities to the SDGs. It is strongly recommended to use strategic communication channels as a means of applying standard reports, sharing actions in an ethical and transparent way, even presenting actions that did not generate expected results.

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Environmental Diagnosis of the Unconfined Aquifer in the Coastal Region of Northeast Brazil

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Abstract

Groundwater is a large percentage of sweet easily accessible water and is often the only option for drinking water supply. In general, it possesses better quality due to interactions with the ground during percolation. In urban areas, however, various activities compromise its quality and demand, such as installation of black tanks, wastewater without treatment or with inadequate treatment, improper disposal of solid waste, waterproofing recharge areas, storage of dangerous products in underground or air tanks without basin containment, among others. The aim of this study was to evaluate the contamination of the unconfined aquifer in the North Zone of Aracaju, SE, through the analysis of physical, chemical and biological parameters of water samples from shallow wells, relating to potential sources of contamination, evaluating the effects of seasonality and comparing them to the limits of potability of Decree No. 2,914 / 2011 of the Ministry of Health, the results show that all samples were unfit for human consumption for at least one of the 13 analyzed parameters, with the most significant change in the dry season.

Keywords: groundwater; water quality; potability standards

1. Introduction

Groundwater generally has good quality for human consumption, requiring less treatment costs than surface water, which makes it more accessible to the public (LAVOIE et al, 2015). Although a significant portion of Brazilian municipalities use groundwater to supply, there are few studies about the resource, its water potential and quality, and most of these are focused on specific issues in the characterization of contaminated sites (ANA, 2007; IBGE, 2010).

According to Araujo (2009), regions with sandy soil and sedimentary rocks, such as Aracaju, are potential suppliers of underground water by porosity and high permeability of this formation, allowing exploration of significant flows.

By being more superficial, the unconfined aquifer is the most exploited by population, and is highly susceptible to contamination (E SILVA ARAUJO, 2003; LIBANIO, 2005; Silva et al, 2014). The contamination of these aquifers is reflected in an important public health problem, since the human consumption of drinking water is one of the biggest ways to prevent disease (E ARAUJO SILVA, 2003).

According to data published by IBGE (2010), only 26 municipalities in Sergipe have sewage, and, out of these, only 07 perform some kind of treatment. The lack of an efficient environmental sanitation system requires the use of tank-filter-sink, contributing to groundwater contamination, naturally high in sandy soils (FRANCE 2011). Garcia et al (2011) identified contaminated areas in the greater Aracaju associated with domestic and industrial effluents untreated, from trace metals analysis in sediments of rivers, potential contamination of the aquifer.

CETESB reported in 2014 that 5,148 contaminated areas, of which 74.3% related to gas stations and 16.74% industries. Fuels have compounds such as Benzene, Toluene, Ethylbenzene and Xylene, which have high toxicity and carcinogenic potential, directly affecting the central nervous system. Once present in the aquifer, decontamination procedures are needed, usually with high implementation costs.

Because of the susceptibility to so many potential sources of pollution, analysis of physical and chemical parameters is not only important to assess water quality in relation to legislation, but also to evaluate their behavior with the contamination, such as its potential for degradation.

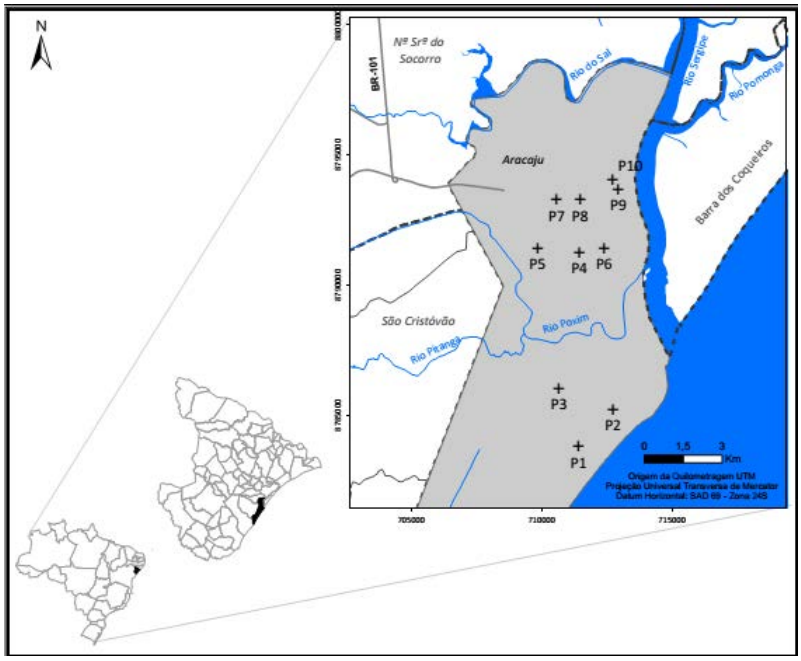
In this context, the aim of this study is to evaluate the contamination of the unconfined aquifer in the North Zone of the municipality of Aracaju / SE, through the analysis of physical, chemical and biological parameters in water samples from shallow wells, relating to human activities and potential sources contamination, comparing the results to the limits of potability of Decree No. 2,914 / 2011 of the Ministry of Health.

2. Materials and methods

2.1. Study Area

The study area is located the north of the city of Aracaju and in the east of Sergipe, being part of the basin of the Sergipe and Vaza Barris Rivers (Figure 1). Data published by the IBGE (2016), the estimated population of Aracaju in 2015 was of 632,744 inhabitants, the most populous city in the state. The climate is megathermal sub-humid, with an average monthly temperatures ranging from 24.65 ° C to 27.32 ° C, rainy season between April and August, and the dry season between September and March. The

predominant aquifer is the granular one, formed by sedimentary rocks of the surface formations of the Cenozoic Era, with good storage capacity and water supply due to primary porosity and high permeability of sandy soils (PINTO et al, 2000; ARAUJO, 2009; SERGIPE, 2012; JESUS, 2015 INMET, 2016).



Source: Sergipe (2012).

Figure 1. Study area and location of sampling points.

2.2. Methodology

For this work, 10 shallows monitoring wells (up to 8 m deep) were selected to collect, all of them already existing, manually drilled with auger and located in the unconfined aquifer in the North Zone of Aracaju. The sample size was established at the cost of analysis and the twells available for collection. The samplings were carried out in May (rainy season) and in November and December 2015 (dry season), evaluating the seasonal effect for the environmental parameters: pH, temperature, electrical conductivity, total dissolved solids, turbidity, color, dissolved oxygen, chlorine, free residual nutrients (nitrate, nitrite, ammonia and phosphate), total coliforms, fecal coliforms.

Samples were taken with a sampler bailer manual of double valve, disposable, and immediately transferred to containers appropriate for each analysis, properly identified with tags, and preserved in ice. The valve in the bailer allows the sample to be transferred to sample containers with less loss of volatiles compounds (ASTM, 2010). The collection forms were filled with the data on the collected sample (place, date, sample number, time condition), and the static level of the well.

The preservation of the samples and analysis of the parameters followed the analytic method described in Standard Methods for the Examination of Water and Wastewater (APHA, 1998). Analyses were performed at the Environmental Analytical Chemistry Laboratory - LQA - in the Federal University of Sergipe, except total and fecal coliforms, which were analyzed at the Technological Institute and Research of the State of Sergipe - ITPS.

The results were analyzed for dry and rainy season, and when appropriate, compared to the maximum permissible values recommended by Decree No. 2,914 / 2011 of the Ministry of Health, and the CONAMA

420/2009 in order to characterize the quality of the underground water for potable purposes.

3. Results and discussion

The results obtained in this study were tabulated and analyzed for physico-chemical parameters mentioned above.

3.1. Temperature and pH

The temperature of the samples ranged from 29.4 to 35 °C during the rainy season and from 32.1 to 35.8 °C in the dry season. The pH is a function of the carbon dioxide dissolved in water, and in underground water usually varies between 5.5 and 8.5 (SANTOS, 2000). The pH values ranged from 6.07 to 7.16 in the rainy season and from 4.10 to 7.29 in the dry season. Ordinance No. 2,914 / 2011 of the Ministry of Health does not provide a value for human consumption, but recommends pH between 6.0 and 9.5 in the distribution system. For this group, only the sample of P10 (pH = 4.1), dry period, would be outside the box and require a pH correction.

3.2. Electrical Conductivity (EC)

The electrical conductivity is the result of dissolved salts in the water, in the form of ions (SANTOS, 2000; LIBANIO, 2005). In the dry season, there was an increase of conductivity in all analyzed points. The values ranged from 119.7 to 1047.0 $\mu S.cm^{-1}$ in the rainy season, and from 578.0 to 4705.0 $\mu S.cm^{-1}$ in the dry season. This behavior, in general, is a consequence of higher dilution of compounds during the rainy season. Capp et al (2012) associated the high electrical conductivity values detected in four sample from shallow wells in the urban area of Anastacio / MS to the absence of an effective health system and public policies which performed an effective control of pollution sources (Table 1).

3.3. Total Dissolved Solids (TDS), Turbidity and Color

Following the same trend of conductivity, the total dissolved solids concentrations were higher in the dry season in all analyzed points, ranging from 59.9 to 522.0 mg L^{-1} in the dry season, and from 287.5 to 2,360.0 mg L^{-1} in the rainy season (Table 1). Out of the 10 points analyzed in the dry season, seven samples do not meet the potability standards of the Ministry of Health, which determines the maximum value of 1,000.0 mg L^{-1}.

Turbidity is an interference with the passage of the light in water as a result of suspended solids (SANTOS, 2000; LIBANIO, 2005). All samples in the two campaigns showed turbidity below 5 UT, thus meeting the potability standards. Color, in turn, is commonly the result of dissolved compounds, such as iron and manganese, and may be related to decomposition of organic matter or human influence (LIBANIO, 2005; BRAZIL, 2013). Of the points analyzed, only the P07 showed color values within the limit established by the decree of the Ministry of Health (under 15 uH or 15 mg L^{-1} Pt-Co) in the two campaigns analyzed, with values equal to 6.67 uH and 9.27 uH in the rainy and dry seasons, respectively (Table 1) and (Table 2).

Table 1. Physicochemical parameters analyzed in the groundwater samples for the rainy season.

Site	T	pH	EC	DTS	Turbidity	Color	DO
	°C	mg L^{-1}	µS cm^{-1}	mg L^{-1}	NTU	mg L^{-1} Pt-Co	mg L^{-1}
P01	34.7	7.14 ±0.13	957.00 ±34.69	485.00 ±18.19	25.40 ±12.49	27.59 ±1.49	0.21 ±0.05
P02	31.6	6.76 ±0.19	1,047.00 ±32.49	522.00 ±17.63	76.00 ±9.08	40.55 ±1.88	0
P03	33.0	6.53 ±0.27	283.00 ±35.52	142.00 ±15.08	49.00 ±9.00	41.84 ±0.98	0.83 ±0.09
P04	31.2	6.07 ±0.18	441.00 ±20.21	224.00 ±26.03	41.80 ±10.15	23.15 ±0.40	1.38 ±0.15
P05	31.4	6.07 ±0.19	241.00 ±27.45	121.00 ±11.39	26.70 ±3.15	37.77 ±1.24	0.83 ±0.14
P06	30.4	6.69 ±0.26	965.00 ±23.93	483.00 ±6.32	68.60 ±11.24	22.04 ±0.40	0.69 ±0.05
P07	29.4	7.16 ±0.19	158.30 ±57.49	79.70 ±31.58	17.90 ±5.35	6.67 ±0.99	2.76 ±0.13
P08	35.0	6.70 ±0.26	540.00 ±33.01	271.00 ±6.30	13.53 ±2.75	9.26 ±1.13	0.96 ±0.12
P09	30.4	7.06 ±0.21	119.70 ±36.47	59.90 ±18.76	18.22 ±5.58	12.59 ±0.85	2.62 ±0.07
P10	29.9	6.69 ±0.14	814.00 ±30.11	407.00 ±27.17	16.02 ±14.49	34.07 ±2.09	0.69 ±0.10

n.d. Not detected

3.4. Dissolved Oxygen (DO) and Free Residual Chlorine

Despite the concentration of dissolved oxygen in the water does not influence the potability, its review allows us to understand the system dynamics and is directly related to the degradation of some organic compounds. Most of the samples showed a concentration of dissolved oxygen lower or absent in the dry season, with the exception of P04, P05 and P06 points. The P02 point showed no dissolved oxygen in any of the campaigns made. It is possible that this absence is related to biodegradation of organic compounds derived from a recent contamination by domestic sewage, as evidenced by high ammonia levels identified.

Free residual chlorine was not detected in any of the studied points.

Table 2. Physicochemical parameters analyzed in the groundwater samples for the dry season.

Site	T	pH	EC	DTS	Turbidity	Color	DO
	°C	mg L^{-1}	µS cm^{-1}	mg L^{-1}	NTU	mg L^{-1} Pt-Co	mg L^{-1}
P01	34.5	6.80 ±0.16	3,080.00 ±6.73	1,550.00 ±27.66	71.40 ±6.25	66.13 ±0.32	n.d.
P02	32.6	6.80 ±0.12	3,590.00 ±25.40	1,790.00 ±29.68	66.80 ±10.42	60.92 ±1.50	n.d.
P03	34.3	7.09 ±0.31	2,205.00 ±12.44	1,095.00 ±11.29	38.00 ±6.73	138.77 ±1.44	n.d.
P04	33.0	6.32 ±0.16	2,950.00 ±40.33	1,475.00 ±19.06	12.34 ±6.81	61.52 ±1.29	1.65 ±0.15
P05	32.9	7.29 ±0.23	578.00 ±13.27	287.50 ±31.04	13.02 ±6.25	87.38 ±0.35	1.59 ±0.04
P06	32.1	6.74 ±0.17	4,705.00 ±15.69	2,360.00 ±29.85	58.80 ±4.79	45.07 ±1.63	3.72 ±0.10
P07	32.6	6.94 ±0.28	1,910.00 ±25.27	950.00 ±17.31	23.40 ±4.76	9.27 ±0.88	0.96 ±0.11
P08	34.5	6.98 ±0.17	2,650.00 ±10.16	1,330.00 ±18.88	20.40 ±7.50	27.40 ±2.12	0.41 ±0.03
P09	32.9	6.85 ±0.27	1,535.00 ±38.23	775.00 ±15.47	8.67 ±1.00	27.78 ±0.84	1.38 ±0.10
P10	35.8	4.10 ±0.14	4,360.00 ±42.93	2,175.00 ±12.48	56.40 ±5.14	98.38 ±0.97	n.d.

n.d. Not detected

3.5. Nutrients: Nitrate, Nitrite, Ammonia and Phosphate

The nutrients are represented by nitrogen and phosphorus compounds and are related in general to contamination by agricultural fertilizers and sewage. Among nitrogen compounds, nitrate is the most commonly found in groundwater once is the most stable form of dissolved nitrogen, and represents an

earlier contamination, while higher concentrations of nitrite, for example, correspond to a recent contamination (SON, 2000; SANTOS, 2000).

Nitrate, Nitrite, Ammonia and Phosphate showed higher concentrations in the dry season, when there is less dilution of existing pollutants. Only 03 points had nitrate levels above the limit of 10 mg L^{-1} under Brazilian law for human consumption - P04, P06 and P08. The P06 and P08 points have rainwater drainage channels nearby, which the odor and appearance are clandestinely used to launch domestic sewage, and may influence those identified high concentrations. The P04 is located in a predominantly residential area, with marked vertical integration, and found levels must be related to contamination by black tanks, mainly of homes and older buildings.

As regarding to nitrite, the concentrations were below the legal limit (1 mg L^{-1}), and in three points were not detected concentrations in any of the campaigns (P01, P02 and P09), and in the points P05 and P07 were only detected in the dry season.

The six points analyzed showed ammonia values within the potability standards, below 1.5 mg L^{-1}. The remaining points went beyond, and the P02 more critical, with 26.54 and 32.04 mg L^{-1} in the rainy and dry seasons, respectively (Table 3) and (Table 4), indicative of a recent contamination by domestic sewage. The absence of dissolved oxygen at this point may be the result of oxidation and biodegradation processes of these compounds.

Table 3. Total concentration of nutrients in ground water in the rainy season.

Site	Nitrate	Nitrite	Ammonia	Phosphate
	mg L^{-1}	mg L^{-1}	mg L^{-1}	mg L^{-1}
P01	2.624 ±0.204	n.d.	2.128 ±0.019	n.d
P02	3.034 ±0.119	n.d.	26.536 ±0.007	0.036 ±0.014
P03	8.092 ±0.133	0.044 ±0.008	0.595 ±0.008	n.d.
P04	36.244 ±0.196	0.026 ±0.003	0.585 ±0.015	0.991 ±0.021
P05	4.225 ±0.148	n.d.	0.758 ±0.012	0.091 ±0.012
P06	49.597 ±0.119	0.294 ±0.054	2.383 ±0.010	2.197 ±0.010
P07	5.309 ±0.192	n.d.	0.654 ±0.018	0.119 ±0.019
P08	32.483 ±0.100	0.396 ±0.083	0.393 ±0.010	3.309 ±0.018
P09	5.536 ±0.108	n.d.	0.669 ±0.021	0.102 ±0.012
P10	4.995 ±0.205	n.d.	6.071 ±0.011	0.029 ±0.018

n.d. Not detected

Phosphate has no maximum value defined by the legislation as it presents no risk to health. Their environmental relevance is due to be strongly related to the presence of detergents, fertilizers and sewage (SON, 2000; SANTOS, 2000). According to Santos (2000) and Silva et al (2014), concentrations above 1 mg L^{-1} are indicative of polluted water, which would be the case of the water collected from P01, P04, P06 and P08 points.

Table 4. Total concentration of nutrients in ground water in the dry season.

Site	Nitrate	Nitrite	Ammonia	Phosphate
	mg L^{-1}	mg L^{-1}	mg L^{-1}	mg L^{-1}
P01	2.691 ±0.190	n.d.	2.220 ±0.010	1.086 ±0.019
P02	3.492 ±0.189	n.d.	32.044 ±0.018	0.038 ±0.21
P03	9.779 ±0.209	0.049 ±0.007	0.646 ±0.015	n.d.
P04	38.187 ±0.120	0.027 ±0.007	0.628 ±0.011	1.045 ±0.015
P05	5.154 ±0.170	0.0013 ±0.0009	0.893 ±0.014	0.110 ±0.020
P06	59.312 ±0.165	0.320 ±0.087	2.503 ±0.016	2.507 ±0.020
P07	5.851 ±0.206	0.023 ±0.005	0.721 ±0.014	0.130 ±0.015
P08	36.183 ±0.141	0.467 ±0.069	0.415 ±0.006	3.608 ±0.020
P09	6.522 ±0.099	n.d.	0.805 ±0.018	0.122 ±0.016
P10	5.961 ±0.195	0.093 ±0.006	6.929 ±0.006	0.033 ±0.014

n.d. Not detected

The increase in nutrient concentrations observed in P04, P05 and P06 points, associated with the increased concentrations of dissolved oxygen, indicates that local conditions do not favor the biodegradation of this compound.

3.6. Total and Fecal Coliforms

Microbiological analysis is an important tool for water quality control, because diseases such as cholera, typhoid, gastroenteritis, leptospirosis, diarrhea, among others, are borne pathogens present organisms in the stool, which reach groundwater by domestic sewage without treatment and disinfection (Garcia and ALVES, 2006). The determination of microbiological pattern is made by quantification of thermotolerant coliforms, used as indicators of pathogenic organisms, to be easier to detect and quantify, having longer life in water than bacterial intestinal pathogens, they do not multiply when out of the human intestine and are more resistant to disinfectants (BRAZIL, 2013).

The presence of total and fecal coliforms in all samples analyzed in the rainy season was detected. In the dry period, total coliforms were detected in 7 of 10 points analyzed and fecal coliforms found in two points, P01 and P10. In the rainy season, the major input of water causes flooding of septic tanks and carries contaminants and pathogens in the environment in greater quantity than the natural percolation of tanks, which explains the higher concentration of these organisms in samples of the rainy season. According to Decree No. 2,914/11, total coliforms should be absent in 100ml sample, and regarding to the thermotolerant, it only mentions Escherichia coli, which is a more specific indicator of recent fecal contamination (BRAZIL, 2013). Thus, all points would be unfit for human consumption by at least one of the campaigns. Groundwater assessment studies of shallow wells have found similar results (Silva and Araujo, 2003; Silva et al, 2013; Silva et al, 2014).

Thus, the analysis of the quality of the unconfined aquifer for human consumption was made based on the maximum amounts permitted by potability of Decree No. 2,914/11, the Ministry of Health (BRAZIL, 2011). Among the 13 parameters analyzed in this study, 7 have maximum limits set by the said ordinance, and determine whether the water is very or not for this use. It was observed that all 10 points are considered suitable for human consumption to at least one potability parameters. A similar result was obtained by

Lamb et al (2011) analysis of 10 shallow wells used for domestic supply in the city of Macaé/RJ, identifying 9 points off the water potability standards, and therefore are also unfit for human consumption.

In number of parameters exceeded, the P01, P02 and P10 points presented the most critical results, as would be improper to 9, 10 and 5 parameters in the rainy season, and 10, 9 and 12 parameters in the dry season, respectively. The parameter which showed changes among the 20 samples analyzed were total coliforms, which was present in 17 samples (10 samples in the rainy season and 7 in the dry season). Fecal coliforms were also present in most samples, being detected in all samples of the rainy season and in two samples in the dry season, P01 and P10. Color was also representative, with values exceeded in 16 samples (7 in the dry season and 9 in the rainy season).

4. Conclusion

Aracaju has vulnerabilities which allow us to infer a poor quality of the unconfined aquifer, because besides the existence of the various impacts inherent to urban areas, the predominance of sandy soils provides conditions favorable for contamination. The results diagnosed that water is suitable for human consumption at all points analyzed for at least one parameter potability.

High levels of nitrogen and coliform were found, probably as a result of the use of black tanks or domestic wastewater treatment systems inadequate for the population. The domestic sewage is not done in all areas of the city, often requiring the implementation of alternative systems for the population.

Regarding seasonality, in 8 of the 13 parameters analyzed, the results were higher in the dry season, mainly related to higher dilution of compounds in the rainy season. As regards to the coliforms, however, the opposite occurred, the values were higher in the rainy season (highest number of contaminated samples), they reflect the flooding of tanks in that period, and the entrainment of pathogenic organisms.

5. Acknowledgement

The authors would like to thank LTMA-UFS for providing the space to simulate the model; CNPq (process 308490/2015-0), CAPES and FAPITEC for the financial support, Postgradauate Program in Water Resources - PRORH and the Federal University of Sergipe for their support to the research and publication of this article.

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The Concept of Experience Applied to Tourist Products Commercialized in São Luis (Maranhão, Brazil)

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Abstract

Analysis of the importance of applying the concept of experience in tourism products and services as a way to add value to tourism. Its objective is to verify if the dimensions of the tourist experience are applied to tourism products and services marketed, in the city of São Luís, Maranhão, with the object of analysis being the Historical Soiree Project of the Municipal Tourism Secretariat of São Luís, Maranhão, Brazil. Strategy of promotion of tourism in the region based on playful work and interaction with the viewer. The research was characterized as exploratory-descriptive, carried out by means of bibliographic and documentary research and field research, having as a data collection instrument interviews with tourists and visitors from January to February 2019. It discusses the concept of experience in its multiple meanings and how tourist experiences can provide memorable moments for tourists. It highlights the concept of experience tourism or experiential tourism when listed in tourism products and services. It characterizes

the Historical Soiree, showing how this action is performed to provide interaction with visitors, aligning the discussions of the dimensions of the experience with the reports of the participants.

Keywords: Experience in tourism; Tourist service providers; Historical Soiree; Touristic experience in São Luís, Maranhão, Brazil.

1. Introduction

As a socio-spatial, historical and cultural phenomenon, or tourism, we are following dynamic processes underway in many sectors, highlighting two or two profiles for two tourists and worshiping unplanned technologies and offering non-market tourism products and services. A new perspective is linked to tourism, in which destinations tend to add value to their offer of attractions, routes and services, in order to provide visitors with the consumption of products and experiences perceived as unique and provocative of the senses, based on motives, sensations and emotions.

As a result, there is the emergence of an economy of experience, which is based on the planning and organization of products and services with strong emotional appeal, linking sensory territorial experiences that involve greater interaction between tourists and destinations and the role of communities. In this sense, the constituent elements of the cultural heritage of a given region, such as popular festivals and celebrations, local ways of life, music, legends, gastronomy, handicrafts, not only add value to the tourist offer, defining the personality of the place to be visited, but they become important competitive advantages in the tourist market.

The stimulus to the creativity of the social actors is reflected in the creation of innovative tourist destinations that provide the expansion of the positive impacts of this activity, such as, for example, the conservation of the environment and greater connection of the communities with their heritage. Therefore, tourism, economy and memorable experiences are associated.

The experience is intrinsically related to the subconscious elements, triggered by a flavor, aroma, among other stimuli (Benjamin, 1989; Sousa, 2010). This is associated with memory, events and shared experiences that make them unforgettable. Tourism has a multiple and complex nature, having a direct relationship with services, economic activities, and an interpretative human activity of the world, resulting in situations of learning, leisure, business and entertainment. Added to these situations is the experience that the tourist adds and the knowledge resulting from them.

The tourist, as a subject, would be becoming more emotional, in search of a deeper relationship with the communities and with the scenery of their travels, having a more direct interaction with the local culture and customs. For tourists, the memory of an experience lived in a destination can be eternal. There are countless reasons that can cause pleasant emotions and sensations for travelers, and tourist products designed, planned, marketed and offered with the purpose of providing unique experiences for tourists, can be a determining factor for their loyalty and provides you with memorable moments.

Based on the above, this article aims to verify whether the dimensions of the tourist experience are applied to tourism products and services marketed in the city of São Luís, Maranhão, having as object of study the "Historical Soiree" tourism project, promoted by Municipal Secretary of Tourism of the city of São Luís,

Maranhão, Brazil. This action consists of a strategy to promote tourism in the region based on playful work and interaction with the viewer.

The central question was, therefore, to realize if the concept of experience is properly valued and applied in the construction of the local tourist offer. In order to operationalize the general objective, the following specific objectives were outlined: to understand the context that enabled the emergence of new forms of production and consumption of tourism products. Understand the experience as a factor of attractiveness of tourist destinations and identify the products and services offered in São Luís, Maranhão, and verify if and how they apply the dimensions of experience tourism.

2. Materials and Methods

In view of the nature of the investigation, the qualitative approach of a descriptive character proved to be the most adequate to achieve the proposed objectives. Qualitative research develops in a natural situation, has rich data to be described, focusing on reality in a complex and contextualized way, where the researcher enters the natural environment of the research and obtains direct data from the source, looking for the real meaning that the research participant gives his life and things (Lüdke and André, 1986).

As data collection procedures, bibliographic research and field research, of an exploratory-descriptive character, were carried out. The bibliographic research allowed the theoretical basis on the subject in question, as well as the definition of the categories of analysis that would be prioritized by the investigation. During the field research phase, initially the mapping of practices, products and services in the city of São Luís, Maranhão, was carried out, which take experience as the basis for its formatting; subsequently, data collection was carried out, using semi-structured interviews as instrumental to tourists. The local community and tourist service providers, in a total of 50 interviews with tourists and 50 interviews with people in the community. In addition to interviews with the managers of the State and Municipal Tourism Secretariat.

3. Results and Discussion

The economy of experience has been impacted different sectors in societies, among which tourism stands out. Throughout its development and consolidation, tourism activity has undergone changes in spite of the incorporation of new technologies, the emergence of social media, which expand the possibilities of consumption of spaces, products and services, reflecting on new models of planning and management of tourist destinations in the market. Furthermore, it is observed that the change in the behavior of tourists has redirected the focus to the creation of tourism products with a strong appeal to the emotions of visitors; such movement has been called experience tourism or experiential tourism. In order to understand its meaning, it is necessary to define the concept of experience and tourist experience.

The concept of experience includes multiple meanings, becoming complex and variable according to the theoretical perspective adopted - anthropological, sociological, psychological and geographical. A first approach on the subject refers to experience as knowledge or expertise related to daily tasks, uninterrupted or habitual, which occur in a continuous flow (Hennes, 2002; Schmitt, 2000); the second perspective refers to experience as the process of experiencing different or unusual situations, which can cause feelings of

discomfort or pleasure (Turner, 1974; Pezzi and Santos, 2012). Other approaches (Pine II and Gilmore, 1999; Oh, FIore and Jeoung, 2007; Matos, 2014) consider the experience a phenomenon that occurs in the consumer's mind when he is subjected to different types of physical, emotional or intellectual interactions: "The experience is manifested in an emotional interpretation of what is seen, heard, smelled or felt" (Pitkänen and Tuohino, 2003, p. 12).

It is understood that the experience emerges as a particular event that occurs in response to certain stimuli and involves the totality of the being that feels it, be it real, unreal or virtual, and results from direct observation or participation in a certain event (Andres et al, 2006). The concept of experience is inseparable from the concept of memory. At this level, we resort to the thought of Benjamim (1983), for whom the experience is related to memory and tradition. When discussing the meaning of experience in the appreciation of works of art in modern times, the author points out that an event to be considered an experience, must refer to deeper meanings, which enable a connection between the subject and history, otherwise the event will be in the level of an experience, which does not lead to a deeper recording in memory:

> The structure of memory is considered a decisive for the philosophical structure of experience. In fact, experience is a fact of tradition, both in collective and private life. It consists not so much in isolated events fixed exactly in memory, as in accumulated data, often unconscious, that converge in memory (Benjamim, 1983, p.30).

In the market context, the experience is related to the perceptions and feelings of consumers in their consumption practices, having an individual character: "[...] the experiences are inherently personal, there is only in the mind of an individual who has been entangled in a emotional, physical, intellectual, or even spiritual level. Therefore, there is no way for two people to go through the same experience, because each experience results from the interaction between the stage of the event (like a play) and the stage of each mind "(Pines II; Gilmore, 1998, p. 89). The experiences also vary according to the situational context, since "each experience derives from the interaction between the event that happened, and the individual's state of mind (his thoughts, his sensations)" (PINE II and GILMORE 1999, p. 12). According to these authors, the concept of experience encompasses four dimensions: a) entertainment; b) education; c) escapism; and d) aesthetics, varying in the intensity of the consumer's participation (passive or active) (Figure 1).

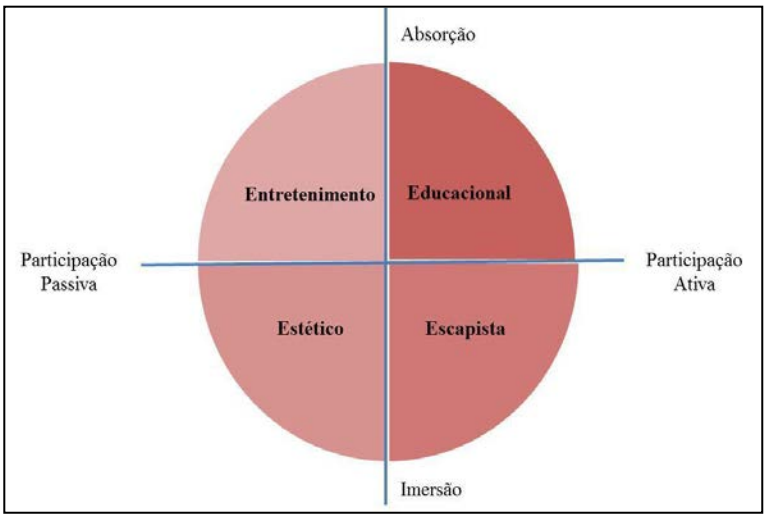

Figure 1. Dimensions of Experience.
Source: Adapted from Pine and Gilmore (2019).

In the model proposed by Pine Gilmore (1999), it is observed that at the level of consumer participation there are two possibilities: absorption refers to the attention that is given to the experience and immersion consists of a direct involvement or participation in the experience. The first highlighted category, entertainment, happens passively and retains attention, being the most common form of experience. Learning is portrayed by the education category, in which knowledge construction occurs through the attention and active participation of individuals. The third category is aesthetics, in which the viewer acts passively, only at the level of contemplating the experience; and the last category refers to escapism / evasion, in which the customer / consumer is in a phase of total immersion in the experience.

This perspective is focused on consumer behavior and emphasizes experiences as a differentiation strategy, increased competitiveness of companies and customer loyalty in relation to other products and services offered in the market, through active consumer participation throughout the process. Thus, the economic value of the experience lies in the perception attributed by the consumer to the event, which must be unique, distinct, individualized and, therefore, unforgettable (Pine and Gilmore, 1999).

In the economy of experience, the stimulus to the five senses increases the potential for differentiating offers, while involving consumers in the event or scenario produced, eliciting unique emotions. Some theorists (Holbrook and Hirschman, 1982; Pine and Gilmore, 1999), have emphasized the importance of aesthetics, hedonism, fun as values that guide consumer decisions and behavior in contemporary times. In the so-called dream society (Jensen, 2001), the emphasis is on the emotional value of products, goods and services; consumers look for stories and emotions in them, in addition to active participation and greater interactivity, seeking greater autonomy and protagonism of emotions and lived experiences.

In the so-called dream society (SørenseneJensen, 2015), the emphasis is on the emotional value of products, goods and services; consumers look for stories and emotions in them, in addition to active participation and greater interactivity, seeking greater autonomy and protagonism of emotions and lived experiences. The memorability characteristic is presented as a key dimension in the scope of the experience economy, and the commercialization of emotions is already a trend practiced by some companies, especially the theme parks. It also becomes a competitive differential in the tourist activity, considering that “a tourist

experience is an event of the past, strong enough to remain in the memory of a long time" (Larsen, 2007, p. 15).

Considered a socio-spatial phenomenon, tourism is understood as the set of interactions that are established between visitors and hosts in the destination region, that is, "a complex combination of interrelationships between production and services, integrating a culturally based social practice, with historical heritage to a diverse environment (Moesch, 2000). Tourism implies the reorganization of territorial spaces based on the implantation or improvement of infrastructure, equipment and attractions, of the commercial and hospitality relations involved in tourism practice.

As a result of these moments of suspension from everyday life, there is the consumption of the tourist product, translated into the tangible and intangible aspects that materialize in the so-called tourist experience: "The trip is not just a geographical, cultural or social displacement, but an inner journey, which justifies being a fundamental experience in people's lives"(Trigo, 2010, p. 23). Based on the concepts of experience presented and, adopting an anthropological perspective, the tourist experience "aims to look at the individual in the interruption of his routine and repetitive behavior" (Pezzi and Vianna, 2015, p. 170); The tourist experience is seen as "a complex combination of objectives, but essentially subjective factors that shape the feelings of tourists" (PAGE and CONNELL, 2009, p. 483).

For the purposes of this research, the tourist experience is the "subjective evaluation of an individual (affective, cognitive and behavioral) and the experience of events related to his tourist activities before (planning and preparation), during (at the destination) and after the trip. (remembrance)" (RITCHIE; TUNG; RITCHIE, 2011, p.1369).

The tourist activity has an aesthetic dimension of the experience that is related to the consumption of the heritage, culture and environment of the places, often reinforced by marketing strategies. In the field of tourist consumption, the importance that experiences acquire in building the image and brand of destinations favors the diversification of attractions and possibilities of consumption of the tourist offer. Activities that generate feelings of entertainment, adventure, avoidance, and links with the history and culture of the places may be able to evoke positive or favorable memories in the minds of tourists / consumers, generating feedback from consumption.

Aho (2001) distinguishes four essential elements of a tourist experience: a) emotional experiences: they are present in most tourist experiences; b) learning or information experiences: those that are intentional or unintentional; c) practical experiences: those that present a variety of forms of professional experiences; d) transformation experiences: those that modify the body or the mind. If tourist service meetings are transformed into "experience meetings", integrating them into the tourism experience to which they are related, this will create added experiential value for tourists and increase the creation of knowledge about them for service providers (Sørensen; Jensen, 2015).

Consumer experiences can be translated into different sensations such as the pleasure of smelling the sea air on a boat trip or even co-piloting a boat, or having your sentimental memory stimulated by the experience of listening and participating in a soiree. As we can see, there are countless reasons in a tourist experience that can cause different emotions and pleasant feelings for the traveler, depending, of course, on how the tourist products are conceived, planned, marketed and offered to the tourist.

In the dimensions of a memorable tourist experience (MTE), several authors (Tung and Ritchie, 2011; Kim,

Ritchie and Mccornick, 2012, Kim, 2014; Aroeira, Dantas and Gosling, 2016) have investigated the relationship between personal, subjective factors and psychological factors of tourists and the environmental or external variables related to the tourist destination - such as the infrastructure and engagement of service providers and public managers, which affect the perception of the quality of products / services offered by tourists. In these studies, although with some differences, some elements are highlighted, such as emotion, knowledge, cultural heritage, accessibility, events, destination management. For these authors, it is necessary to take into account the entire context surrounding the creation of the experience since the existence of available equipment and services, the technical qualification of the service providers, preservation of the environment, and the relationship between tourists in the activities and their involvement with the local community.

The marketing perspective helps us to understand the process of building experiences by tourism service providers, since it allows the establishment of planning and management strategies for the customer / consumer experience through the customization and co-creation of activities (Pine ; Gilmore, 2011) and the generation of emotions and remarkable events (Schmitt, 2004) that promote the transformation of those involved. The positive offer of services can be established as a result of a beneficial relationship between what is projected to the tourist, through marketing work, as well as through a creative look (Hartley, 2005), aiming at local development:

> [...] Local development is indispensable, since the actions established on the cultural and tourist level must have a direct impact on the lives of the inhabitants, on their economic and social conditions, on the future of the territories, with respect for the natural and human components (Mazuel, 2000, pp. 99-100).

Bearing in mind that the experiences are individual and non-transferable (PINE and GILMORE, 1999), tourists are not only consumers, but creators of their own travel experiences. The emergence of a new profile of the tourist consumer also contributes to the emergence of memorable tourist offers, and to the thematization of destinations in favor of unique and significant experiences that add value to the product through local heritage, history, and culture:

> The applicability of the economy of experience in the day-to-day life of companies should include the correct plot (strategy), the appropriate cast (personnel) and the action script (processes). All other departments arising from the metaphor of a play should “participate” in the production of the experience, revealing the theater that exists in each business and letting each one establish their stage of performance, including the client, who takes advantage of experiences to evolve, grow culturally, improvising and reforming, giving such value to experiences that one does not mind paying a premium price [...] this (is) the moment of assimilation of the progression of economic value, due to its potential added value, pointing out its capacity to behave and generate wealth and distinction among those who promote it (COELHO et al.., 2015, p. 7).

Post-tourists seek products and destinations that combine entertainment, connection, hospitality, security,

personalization and education. Reflections of postmodern societies, this group of consumers crave peculiar, unique offers, to experience different sensory experiences through smell, sight, touch, hearing and taste. At the same time, post-tourists seek to interact with the local community. Coupled with new information and communication technologies, social media, tourism service providers can create and / or format products with high levels of emotional content and interactivity, enabling tourists to enjoy multisensory offers.

The emergence of a new tourism is related to the processes of globalization, Information and Communication Technologies (ICTs), the new profile of tourists, which imply new models of management and organization of tourist spaces with a view to the consumption of memorable experiences: "the creation of events and shows that enable tourists to feel and live the emotion of the place, in a constant creative process of innovation, is one of the great challenges of tourist destinations" (Dalonso, Lourenço, Remoaldo and Netto, 105, p.114). From this scenario of transformations, information and experience emerge as strategic values of innovation and competitiveness of destinations in the market.

The result of these efforts consists of not only increasing the competitiveness of tourist destinations and differentiating the offer, but above all in the memorability and uniqueness of the experience. It is in a sense that experience tourism has been the target of interests and debates among tour planners, public and private managers, students and tourism and hospitality professionals as a vector for local and / or regional development and the strengthening of cultures and identities.

However, it is important to note, as explained by Trigo (2010), that not every trip becomes a tourist experience, and Coelho et al (2015, p.07) emphasize that "[...] with very few exceptions, companies are still in the process of incorporating concepts that lead them to search for a differential that can be justified as an experience strategy"(Figure 2).

Figure 2. The relationship between experience and tourism product.
Source: Adapted from Cooper (2005).

The approach on economy of experience and tourism leads us to reflect on the applicability of the dimensions of experience approached by Pine and Gilmore (1999) and encouraged by the tourism production chain of São Luís, Maranhão, as a way of differentiating and inserting this destination in the market national tourism. In the next section of the paper, the methodological procedures and the main results obtained during the investigation of experience and tourism in the city of São Luís, Maranhão are presented.

From the meaning of the participants' reports of these practices, it is possible to understand if and how the dimensions of the experience are applied. The first aspect pointed out by the interviewees who participated in the Historical Soiree and the Historical Serenade was the unique character of the experience, as can be

seen in the following statements: “I think the event has poetry, it has something playful and it also has an almost religious way. The tour is like a procession and I find it very interesting and different. My people, in Colombia, we don't do anything like that”(Informant 02). Yet, “Very beautiful, I've never seen anything like that. I really liked it, very good”(Informant 04).

An informant who underlined highlighted the memorable factor, the striking episode in the tourist’s memory: “I am thrilled, I am amazed, delighted. Since the first time I came to São Luís, but I didn't see it here, it is the second time that I have the opportunity and I am extremely delighted” (Informant 06).

When asked about what kind of feelings caused by the participants, the interviewees were emphatic in affirming the aspects of education, sociability, relaxation and well-being, as pointed out by the following informants: “Tranquility, peace, coziness. To interact with other people”, “Gratitude. The question of love for my city” (Informant 08).

Tourist travel presupposes the interruption of the daily rhythm by the consumption of unique experiences and, in this sense; tourist experiences are created to strengthen the links between tourists / consumers and the images and brands of destinations. The Historical Soiree includes elements of experience design in the process of setting the spaces in the historic center, in the use of actors to perform performances, in the interaction of musicians with the public, and in the theme of the stories that are enacted throughout the script.

One of the informants reported the importance of learning about the history and culture of the city in a playful way, through the interaction between the actors, the heritage and the audience: “The event was very marked because of more knowledge than us are having. We also got to know the Historical Center a little yesterday, so we're getting to know it more through the Serenade” (Informant 05).

The interviewed informants pointed out as main characteristic the expansion of knowledge about the history and culture of the city, of its colonial past based on the staging and musicality, elements that activate the individual memory and articulate with the memory of the urban space. Araújo and Posenatto (2010, p.127) reinforce the potential of the arts for the development of tourism, pointing out that art plays “the function of an effective tool in the reproduction and propagation of the culture of any locality, because through it is possible to count the history of a people and reaffirm their cultural identity through differentiated and creative entertainment” and, thus, provoking new experiences in the city.

As Benjamim (1983) emphasizes, experience is linked to memory and tradition. The elements staged by the Historical Soiree (Figure 3) trigger elements of memory, enabling the apprehension of the experience, while allowing the emergence of different emotions, and private memories for tourists / visitors who consumed this product.

When asked about the type of feelings caused by the tour, an informant expressed it as follows: “It is nostalgic, despite not having lived at the time, but being from a long-lived family, so most of these songs that I listen to today, it takes me back to the time when my mother and great-aunts sang to me. So, for me, every time I listen to a song like that, by Catulo da Paixão Cearense and such, it is remote to the times, forty years ago, when I was cherished by these songs. So, I like it very much” (Informant 04).

Figure 3. Historical Soiree.
Source: Anonymous, 2019.

Tourism encourages the preservation and conservation of the areas where it develops, strengthens the community spirit, promotes the appreciation of the memory and history of a particular place. “The understanding that the tourist activity itself can function as a motivator for the maintenance of the local identity places tourism as one of the great current economic alternatives for urban centers [...]” (Simão, 2000, p. 04).

The Historical Center of São Luís keeps elements that evoke affective memories for the local community, it is a place-memory that evokes memories of a certain historical context. Initiatives such as Historical Soiree and Historic Serenade, Sunset at the Palace, contribute to the actions of revitalizing this tourist space, through the establishment of a collaboration network between public managers and private initiative.

4. Conclusion

By transforming the heritage as an object of the tourist look, this activity promotes innumerable relationships, causing significant transformations in the social, economic, environmental and cultural life of the receiving society. These effects can be both positive and negative. Regarding the positive effects of tourism on the culture visited, we have the renewal of the uses of heritage, the enhancement of the identity of the place and the strengthening of festivals and cultural traditions.

Another opportunity focuses on the recognition of local receptive agents on the importance that the experience tourism segment acquires for the city of São Luís. According to the municipal managers interviewed, tourists and visitors - despite the preferences and motivations that have an impact on the choice of the municipality as a holiday destination - they often show interest in knowing the local heritage and cultural aspects.

The possibility of formatting a thematic script based on traditional knowledge, practices and experiences, emerges as an alternative to diversify the options of products and services offered by local receptive agencies, while suggesting strategies for customer loyalty, “adding greater value to its tourist offer, emphasizing the authenticity of its natural and cultural scenarios, and the contact with the population of each place, that is, emphasizing what is called the 'sense of place' (Molina, 2015, p.56).

Tourism cannot be seen in an isolated or fragmented way. As pointed out by Beni (1998), tourism is a

system formed by several elements. This systemic vision is perceived and evaluated by tourists when they are visiting the destination, therefore, the joint work of all tourism professionals is essential to deliver to tourists a differentiating experience from their daily lives, with quality, ethics, responsibility and broad participation by the local community. Thus, tourism can be translated into an instrument for the achievement of sustainability and local development.

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Nanocapsules With Naringin And Naringenin Affect Hepatic and Renal Energy Metabolism Without Altering Serum Markers of Toxicity in Rats

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ABSTRACT

Naringin and naringenin are flavonoids found in citrus fruits and have several health benefits, however these compounds are susceptible to degradation, limiting their therapeutic application. To solve this problem, an alternative is to incorporate them into nanocapsules. The aim of this work was to evaluate the toxicity of these nanocapsules against renal and hepatic serum markers and also on the activities of pyruvate kinase, Mg^{2+}-ATPase, and creatine kinase. Nanocapsules containing naringin and naringenin, nanocapsules without the active compounds and the compounds in their free form were administered orally, once a day, for 28 days. After treatment, the serum levels of hepatic and renal markers were not altered, nor the activities of pyruvate kinase tissue, however, the treatment of nanocapsules with flavonoids increased the activities of mitochondrial creatine kinase in the kidney and hepatic Mg^{2+}-ATPase. Thus, renal and hepatic serum markers, which are normally used as indicators of toxicity, did not change after the period of administration of the nanoparticles. However, the activities of important enzymes of the energy metabolism in these organs were affected. Our findings reinforce that nanomaterial testing for toxicity needs to go beyond traditional methods to ensure the safe use of nanoparticles for therapeutic purposes.

Keywords: nanoparticles, flavonoids, nanotoxicity, creatine kinase, Mg^{2+}-ATPase.

1. Introduction

Naringin (NA) and naringenin (NG) are flavonoids found in various citrus fruits, especially grapefruit, and are used by the population because they have antioxidant, anti-inflammatory, anticancer activities and several other effects that bring medical interest in their use (Alam et al. 2014). Despite the health benefits of NA and NG, they are moderately soluble in water, unstable and have extensive first-pass metabolism, resulting in low bioavailability when administered orally. To overcome these problems, it is necessary to improve the preparation and administration of these compounds, an alternative is the use of nanocarrier systems, such as nanocapsules, which improve the pharmacological stability of substances and increase their bioavailability and efficacy (Ferreira et al. 2015).

For these nanocapsules to be used in medicine for therapeutic purposes, previous tests are necessary, and toxicity is one of the most important factors to be considered (Novo et al. 2013). A study by Pohl et al. (2017) demonstrated that oral administration of nanocapsules containing NA and NG, for 28 days, did not cause oxidative stress in stomachs of Wistar rats, indicating that these nanoparticles may not be toxic, but

other analyzes need to be performed to corroborate the safe use of these nanoparticles. Therefore, to verify the safety of these nanocapsules we analyzed the parameters of renal and hepatic toxicity.

The kidneys are excellent markers of toxicity because they act as a filter, eliminating metabolites and toxins from the blood through the urine (Nelson and Cox 2014). The liver has the ability to detoxify, that is, remove many toxic compounds such as alcohol and drugs that are ingested or produced by the body (Motta 2009). One of the most affected organs and one of the main targets of most chemicals that cause toxic effects after environmental exposure is the liver, but new studies have shown that it is also possible to find lesions after this chemical exposure in the kidneys, but there are still doubts regarding specific aspects of renal function (Kataria et al. 2015).

In order to verify the effect of the nanocapsules on renal and hepatic function we decided to carry out a more in-depth investigation in addition to the first triage clinical analyzes, where serum markers of toxicity are usually measured, investigating key enzymes in energy metabolism so that the results are more accurate, thus guaranteeing the safety of the use of these nanoparticles. We evaluated the cellular energy metabolism, which is responsible for the energy supply to cells through the transformation of molecules and nutrients into adenosine triphosphate (ATP) and other molecules capable of providing energy to the cellular biological work. These processes of energy generation are performed by several enzymes that are fundamental in cellular energy metabolism (Nelson and Cox 2014; Mussoi and Rech 2019). Among these enzymes are pyruvate kinase (PK) and magnesium ATPase (Mg^{2+} -ATPase) and creatine kinase (CK) (Shuch et al. 2013), however, CK is not found in hepatocytes (Wallimann and Hemmer 1994) and therefore we did not evaluate it in this study.

PK is an important enzyme of the metabolic pathway of glucose, one of the main ways of obtaining energy from the renal and hepatic cells. This enzyme catalyzes the dephosphorylation of phosphoenolpyruvate (PEP) in pyruvate, producing two molecules of ATP/glucose (Shuch et al. 2013; Israelsen and Vander Heiden 2015). CK is another enzyme extremely crucial for the maintenance of cellular energy homeostasis. It catalyzes the reversible transfer of the phosphoryl group from phosphocreatine to ADP, regenerating ATP. For this enzyme there is the mitochondrial isoform (mitCK), which uses ATP to form phosphocreatine and ADP, and the cytosolic isoform (cytCK) that forms creatine through phosphocreatine, generating ATP (Ferreira, 2014; Rech et al. 2006, 2018). Mg^{2+}-ATPase is localized in the plasma membrane of renal and hepatic cells and is essential because it carries the Mg^{2+} that is the cofactor of several enzymes involved in energy metabolism (Nozadze et al. 2015). PK, CK and Mg^{2+}-ATPase are important enzymes for the formation of energy. We also evaluated the hepatic markers AST and ALT and the renal markers Cr and U which, when at high levels, indicate tissue damage (Baaij et al. 2015).

Therefore, the objective of this study was to evaluate renal and hepatic toxicity through detection of serum urea (U), creatinine (Cr), aspartate aminotransferase (AST) and alanine aminotransferase (ALT) serum levels, as well as parameters of energy metabolism in liver and kidney.

2. Methodology

2.1 Animals

Twenty-eight male Wistar rats (300-400 g) were used in accordance with ethical standards approved by the Ethics Committee on Animal Use of the Franciscan University (CEUA/UFN) under protocol number 05/2016. The animals had free access to water and standard commercial chow.

The animals were randomly separated into four groups and received by intragastric gavage 2,5 µL per g of body weight of water to control group (C), 5 µg of naringin + 5 µg of naringenin in free form per g of body weight to F group, 5 µg of blank nanocapsules without active compounds (BN) and nanocapsules with 5 µg of naringin + 5 µg naringenin per g of body weight to (NN) group. On the 28th day, the rats were euthanized by decapitation, the kidneys and liver were removed and stored in freezer -80 ºC. Blood from the animals was collected in tubes with separator gel, centrifuged at 800 x *g* for 15 minutes at room temperature. The serum was removed and stored in the freezer at -80 ºC for further analysis of AST, ALT, creatinine and urea.

2.2 Nanoparticles

NA + NG nanocapsules were prepared by Pohl et al. (2017) containing 0.05 g naringin/mL + 0.05 g naringenin/mL, according to the methodology described by Cordenonsi et al. (2016). The aqueous phase consisted of water and polysorbate 80, the organic phase composed of naringin and naringenin, Eudragit L100, sorbitan monostearate, diisopropyl adipate, and ethanol was added in an aqueous phase composed of water and polysorbate 80. The suspensions of blank nanocapsules (NB) were prepared in the same manner without the presence of the drugs. For free form (F), there was no presence of Eudragit L100 in the composition.

The physical-chemical characterization of the nanocapsules showed that the particles containing NA and NG have 102.40 ± 6.6 nm in diameter, polydisperation index of 0.182 ± 0.01, Zeta potential of -13.03 ± 2.5 mV and pH of 3.81 ± 0.01 (Pohl et al. 2017) being in agreement with Cordenonsi et. al (2016).

2.3 Tissue Preparation

The kidneys and liver were weighed and homogenized in a buffer with KCl 50 mM. They were then centrifuged at 800 x *g* for 15 min and after a part of the supernatant was removed for the Mg^{2+}-ATPase assay and another part was centrifuged at 12.000 x *g* for 10 min at 4 ºC, a fraction of the supernatant was removed for the PK and cytCK assay, and the pellet corresponding to the mitochondrial fraction of CK was washed with Tris-sucrose isotonic buffer and resuspended in 100 mM Tris-HCl buffer, pH 7.5, containing 15 mM $MgSO_4$.

2.4 Serum preparation

After decapitation, whole blood was collected in tubes containing separator gel. The tubes were centrifuged at 800 x g for 15 min and the supernatants were used to evaluate serum levels of urea, creatinine, AST and ALT which were determined on a CELM SBA 200 automated analyzer using Labtest kits.

2.5 Magnesium-atpase assay

The activity of Mg^{2+}-ATPase was determined according to a method adapted from Fiske and Subbarow (1925). The reaction contains 5,0 mM $MgCl_2$, 80 mM NaCl, 20 mM KCl e 40 mM of Tris-HCl

buffer, pH 7,4 in a final volume of 200 µL. The inorganic phosphate (Pi) released was measured by the method of Chan et al. (1986). The activity was expressed as nmol Pi/min/mg protein.

2.6 Pyruvate kinase assay

PK activity was measured by the method of Leong et al. (1981). The incubation medium contains 0.1 M Tris-HCl buffer, pH 7.5, 10 mM $MgCl_2$, 0.16 mM NADH, 75 mM KCl, 5.0 mM ADP, 7 units of lactate dehydrogenase (LDH), 0.1% (v/v) Triton X-100, and 10 µL of the mitochondria-free supernatant in a final volume of 0.5 mL. The reaction was started after 30 min of preincubation at 37 ºC by addition of 1.0 mmol/L phosphoenolpyruvate (PEP). All assays were performed in duplicate. Results were expressed as nmol of pyruvate formed per min per mg of protein.

2.7 Creatine kinase assay

CK was estimated according to the colorimetric method of Hughes (1962). The color was developed by the addition of 0.1 mL 2% α-naphtol and 0.1 mL 0.05% diacetyl in a final volume of 1 mL and read after 20 minutes at 540 nm. All assays were performed in duplicate. Results were expressed as nmol of creatine formed per min per mg protein.

2.8 Determination of proteins

The protein content was determined by the method of Lowry et al. (1951). The tests were performed in triplicate. Bovine serum albumin was used as a standard. All determinations were expressed in mg protein/mL.

2.9 Statistical analyses

Data were analyzed using one-way ANOVA. Post hoc analysis of a significant interaction, when required, was performed by the Dunnett test. All data were analyzed by the Statistical Package for Social Sciences software (SPSS 12.0 for Windows). Values of $p < 0.05$ were considered statistically significant.

3. Results

3.1 Renal energy metabolism

The analysis of the results of the renal energy metabolism (Figure 1) shows that the treatments (F, NB and NN) did not change the PK activity (Figure 1a) when compared to that of control animals ($p > 0.05$). However, NB administration increases Mg^{2+}-ATPase activity ($p < 0.001$) when compared to control group ($p < 0.05$) (Figure 1b).

Figure 1c shows that NB ($p < 0.05$) and NN ($p < 0.01$) administrations increased the renal activity of mitCK when compared to that of control animals. The F ($p < 0.001$) and NB ($p < 0.05$) administrations reduced significantly the activity of cytCK, when compared to the control group (Figura 1d).

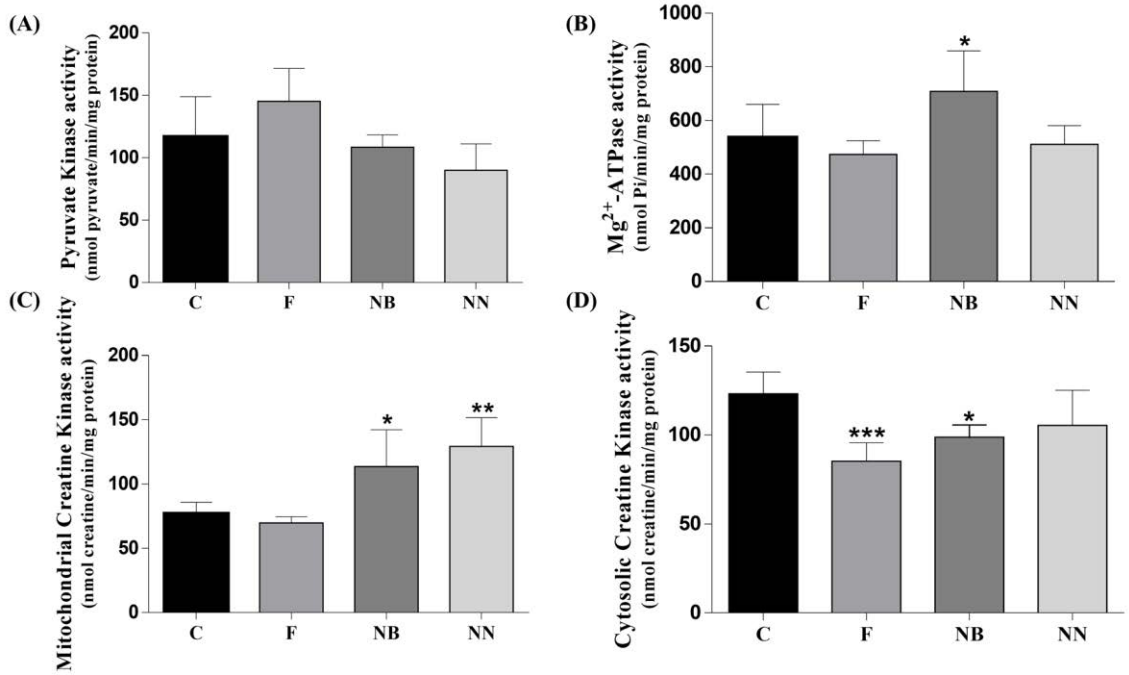

Figure 1. Effect of nanocapsules containing naringenin and naringin on **(a)** PK activity of kidney. **(b)** Mg^{2+}-ATPase activity of kidney. **(c)** mitCK activity of kidney. **(d)** cytCK activity of kidney. Data are mean ± SD (n = 5 to 7 animals per group). *p < 0.05; **p < 0.01; ***p < 0.001 compared to the control group (Dunnett test).

3.2 Hepatic energy metabolism

Regarding to the hepatic energy metabolism enzymes measures (Figure 2), the administrations (F, NB and NN) also did not affect pyruvate kinase activity (Figure 2a) when compared to that of control animals ($p > 0.05$).

On the other hand, F ($p < 0.01$), NB ($p < 0.001$) and NN ($p < 0.001$) treatments did not change the activity of Mg^{2+}-ATPase, in comparison with that of animals from control (Figure 2b).

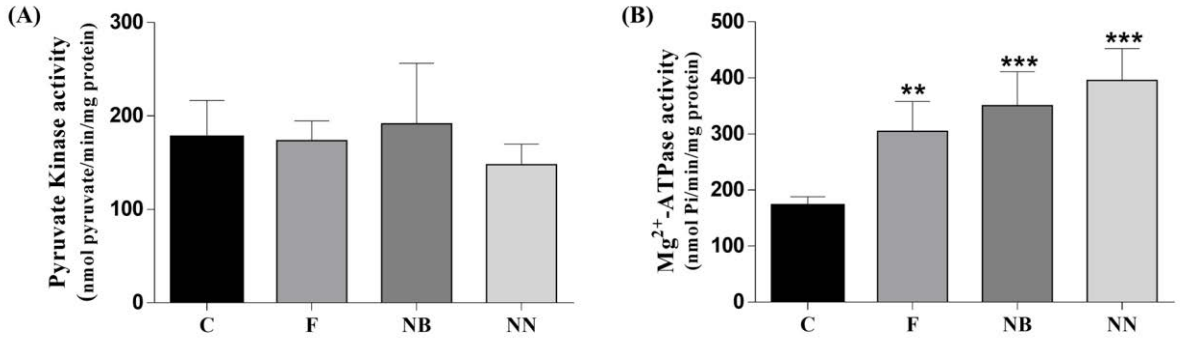

Figure 2. Effect of nanocapsules containing naringenin and naringin on (a) PK activity of liver. (b) Mg^{2+}-ATPase activity of liver. Data are mean ± SD (n = 5 to 7 animals per group). *p < 0.05; **p < 0.01; ***p < 0.001 compared to the control group (Dunnett test).

3.3 Serum markers of renal and hepatic function

Table 1 shows that animals submitted to all treatments did not change the creatinine levels when compared to control animals, however, showed an increase in serum urea levels to F group ($p < 0.05$)

compared to control group (Table 1). Whiles serum AST and ALT activities were not altered by treatments (F, NB and NN) when compared to control animals.

Table 1: Results of renal and hepatic serum markers.

	Urea (mg/dL)	*Creatinine (mg/dL)*	*AST (U/L)*	*ALT (U/L)*
C	35.57 ± 2.7	1.128 ± 0.58	192.85 ± 34.6	59.86 ± 18.1
F	38.86 ± 1.7*	1.31 ± 0.39	187.66 ± 23.6	72.17 ± 7.7
NB	36.43 ± 2.4	1.747 ± 0.90	173.29 ± 51	59.71 ± 16.5
NN	36.29 ± 2.2	0.848 ± 0.57	171.7 ± 33.6	64.86 ± 14.6

The groups are represented by control (C), free (F), nanocapsules without active compounds (NB) and nanocapsules with naringin and naringenin (NN). Data were expressed as mean ± SD. * $p < 0.05$ compared to the control group (Dunnett test).

4. Discussion

Production of the nanoparticles with therapeutic application search the refinement of the pharmacological effects, increasing bioavailability and targeting the active ingredient to the specific location, decreasing toxicity (Nishihira et al. 2019). *In vivo* tests are necessary to evaluate the effect of nanocapsules in a living organism that can simulate the human organism, for that aim is chosen the animal model that, although not completely similar to the human organism, helps us to understand the action mechanisms of the particles and their toxicity thus, it can be applied safely in humans (De Franceschi et al. 2013; Pohl et al. 2017). Therefore, in this study, we investigated whether oral administration of nanocapsules containing NA and NG could affect the activities of energy metabolism enzymes and renal and hepatic markers suggesting toxicity, since the kidneys are essential in drug elimination and the liver the main organ responsible by the detoxification of the organism, thus being important markers of toxicity (Kriz and Kaissling 2008; Nelson and Cox 2014).

A very important enzyme for maintaining cell viability is PK, this enzyme plays a very important role in glycolysis, the main way of obtaining energy from renal and hepatic cells, where it catalyzes the dephosphorylation of phosphoenolpyruvate (PEP) in pyruvate, generating two molecules of ATP by glucose (Shuch et al. 2013). So that the inhibition of the PK is related with decrease intracellular levels of ATP so result damage in the cell viability, in addition the oxidative stress can cause decrease PK due to pyruvate is an antioxidant endogenous molecule, this a very important for the cell homeostasis (Baldissera et al. 2015; Rech et al. 2017). Adenylate kinase (AK), CK and PK are key enzymes for balance the homeostasis energy. These systems operate together, when there a decrease in one enzyme the increase activity of the other can be compensated, for this reason is necessary evaluation for the system complete (Kolling et al. 2019). The results of our study demonstrated that no changes were found in the PK activity on the groups compared to the control in both organs. Thus, none of the treatments altered the mechanism of action of this enzyme.

The main enzyme responsible for the transport of Mg^{2+}, that is a cofactor in the synthesis of ATP, is the Mg^{2+}-ATPase and therefore it was investigated in this study (Silva et al. 2013; Pilchova et al. 2017).

The results showed a significant increase in Mg^{2+}-ATPase activity in the NB group compared to the C groups in the kidney. In the liver, a significant increase was observed in the F, NB and NN groups compared to the control. Studies performed by Ferreira et al. (2015) demonstrate that, at the concentration of 500 µg/mL, the nanocapsules without the compounds and the nanocapsules containing NA and NG reduced the cell viability, therefore showing some toxicity, this toxicity was not found in this parameter in our study because the activity of this enzyme was increased and not decreased. Mg^{2+} -ATPase is a marker of the cell impairment when exposed the toxic compounds, hence when there a reduction in the activity this enzyme is possible show a toxic action these compounds (Sun et al. 2018). Therefore, is possible observe in the ours results what NN and NB don't caused toxicity and kept the effect of the group F. A study by Amudha et al. (2015) demonstrated that water-diluted Naringin flavonoid was able to prevent the reduction of Mg^{2+}-ATPase activity in rats brains under oxidative stress induced by exposure to nickel, thereby helping to preserve cell membrane integrity by inhibiting lipid peroxidation.

Another enzyme that plays an important role in energy metabolism is a CK that catalyzes the reversible transfer of a phosphoryl group from ATP to creatine producing PCr and ADP and, conversely, generates ATP. This enzyme is divided into two isoforms: mitCK and cytCK (Rech et al. 2008; Rowe et al. 2013). The results showed that there was an increase in mitochondrial CK activity in the NB and NN groups compared to the C group, which can also be explained by the results found by Ferreira et al. (2015) that were previously mentioned, once the two nanoparticles demonstrated significant increases in mitCK activity, thus increasing phosphocreatine production, using more ATP and compromising energy metabolism (Ferreira 2014). This detection, as well as the result found in the enzyme Mg^{2+}-ATPase, may be related to the Eudragit polymer that was used in the composition of the nanocapsules but was not used in the F group. However, studies conducted showed that Eudragit obtained results that show safety in its use and do not demonstrate toxicity (Yen et al. 2009; Mustafin 2011).

The results of cytosolic CK demonstrate significantly decrease in the activity in the F and NB groups when compared to the control group. Studies performed in rats with induced cardiomyopathy demonstrated that administration of NA at doses of 100 and 200 mg/kg significantly decreased the activity of CK (Papasani and Annapurna 2014). In another study performed in rats with diabetes, a decrease in CK activity was also found in rats treated with NA, thus demonstrating that this compound and its product NG may decrease the activity of this enzyme, corroborating the discovery of this study (Ahmed et al. 2012). The decrease of the cytosolic CK can cause a reduction of the phosphocreatine transformation in creatine and ATP, therefore occurring a decrease of the ATP production by this enzyme (Ferreira 2014). The results of the cytCK activity demonstrate that the administration of nanocapsules containing NA and NG does not compromise the correct functioning of this enzyme, in addition the nanocapsules prevent the effect of decrease of the CK found in the compounds NA and NG, demonstrating that the nanoencapsulation of these substances decreases the toxicity of the active compounds in free form (Ahmed et al. 2012; Ferreira 2014).

The serum levels of AST and ALT did not show significant differences in either group, this shows that the treatments do not cause hepatic toxicity since the AST and ALT markers are considered sensitive indicators of hepatocellular damage once the damaged liver cells release the enzyme aminotransferase into the circulation, resulting in liver damage (Motta 2009; Ahmed et al. 2019). According to Pari and Amudha (2011), NA supplementation significantly reduced cadmium-induced hepatic toxicity in Wistar rats,

dramatically decreasing lipid peroxidation and restoring antioxidant defense levels. Thus, a possible hepatic protection of the nanoparticles containing NA and NG should be further investigated. Ahmed and collaborators (2019) demonstrated then NA and NG, containg in the navel orange peel hydroethanolic, induced potential hepatopreventive effects, may be mediated via enhancement of the antioxidant defense system, suppression of inflammation and apoptosis.

Here, we demonstrate that serum creatinine and urea levels did not show significant differences, except in the F group compared to the control group showed a significant increase of urea. The increase in urea levels by group F shows that the compounds in the free form may be nephrotoxic, because urea as well as creatinine is a marker of renal damage, since both molecules are filtered by the kidneys and excreted in the urine, thus high serum levels of these markers demonstrate a deficiency in renal function. (Diaz Gonzalez and Scheffer 2003, Guyton and Hall 2006, YU et al. 2007, Deignan et al. 2008). This increase was not found in the NN group, demonstrating that nanoencapsulation of such compounds can prevent such toxicity. A study by Li et al. (2013) showed that the administration of NA for 13 weeks did not alter serum creatinine and urea levels but a study by Arumugam et al. (2016) show that the administration of NA increased urea levels in hyperammonemic mice induced by ammonium chloride.

5. Conclusion

In summary, it can be concluded that the nanocapsules containing naringin and naringenin did not produce renal and hepatic toxicity when investigating the serum markers of toxicity. In addition, the activities of important enzymes of the energy metabolism in these organs were affected by the administration of these nanocapsules demonstrating that nanomaterial toxicity testing needs to go beyond traditional methods. Because of these findings, more studies need to be performed to be sure about the safety of their use.

6. Acknowledgments

This work was supported in part by grants from Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq-Brazil), Fundação de Amparo à Pesquisa do Rio Grande do Sul (FAPERGS, RS-Brazil) and Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES-Brazil).

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The Challenge In The Use Of New Technologies Integrated To Health In The Treatment Of Covid-19: A Brief Critical Analysis In Brazil

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RESUME

Viral diseases continue to emerge and annually bring challenges to the Brazilian public health system, such as COVID-19 with easy respiratory infection. This study aims to analyze the importance of new technologies in the treatment of COVID-19 and, thus, promote the information of technological data in the Brazilian territory. Therefore, methodological techniques were used in systematic reviews in the selection of included studies to be used in the construction of this short and critical systematic review. And 08 articles were included for inclusion in this critical analysis.

Keywords: Security mechanism, health monitoring, security, COVID-19.

INTRODUCTION

In recent years, telemedicine is an emerging technology that has benefited health care areas worldwide and especially patients [35]. For this reason, it is considered an application in the health area through the use of information technology that allows the patient to have control of his/her data outside the hospitalization system and uses this technology [23], for example, through the use of video conferencing or scanned image and the frequent use of this technology has generated a change in Brazilian society and due to the constant change in Brazilian society[12, 24], this technological invasion brings transformations in the treatment and care of patients with viral diseases such as COVID-19 [25]. The SUS brings the Brazilian population access for equity, quality and especially the cost-benefit ratio, the main indicator used in developing countries like Brazil [04, 05]. New technologies, for example, computers, the internet and mobile devices through the use of communication and the search for information have a potential to help solve public health [04] problems such as infectious and viral processes [23,29], using these technologies

means being able to develop a network of treatment and care worldwide and thus have a sustainable solution worldwide [01-09]. One of the great allies of technological advances applied to treatment and care in public health are mobile devices [10-19]. Most individuals on the planet have a personal device for communication, entertainment, mobility and/or information [13, 32]. Access to these means has become increasingly easier, as well as its ability to perform complex functionality [23-31].

The collaborative use of mobile technologies makes it possible to integrate health care techniques in search of better care, prevention, diagnosis and treatment of diseases, such as diabetes, obesity or some other specific pathology [28-33].

According to the WHO (World Health Organization), disability is part of the human condition and imposes numerous challenges in every day life [04, 23]. Most of the people who have some type of disability are affected by psychomotor problems or cerebral palsy, which trigger complications that can cause definitive injuries in speech, locomotion, vision, manipulation or cognitive ability to develop actions [31-35].

However, for this advancement in new technologies to occur, interdisciplinary advancement is necessary, specifically in the use of technologies that use telecommunications [04, 23, 24], and the use of an instrument for the purpose of exchange and administration of health data [27-29]. The use of sensors in viral diseases such as COVID-19 for the purpose of monitoring patients has attracted attention in research due to the possibility of developing the use of new technologies applied specifically in public health [02, 03, 05].

This new technology is known as "Wireless body with network area" and allows for the safe transmission of data to continuously and in real time monitor the patient in order to favor multidisciplinary assistance in the Brazilian public health system [23-31]. COVID-19 allowed the use of new health technologies as a proficient tool that allows us to coordinate efforts among health professionals and thus [12], it is possible to improve care and responses in real time. In the last few months, the COVID-19 pandemic brought technological opportunities to the Brazilian population [13], but it required Brazilian health professionals to train health staff, diagnose and conduct checks or monitor the patient in a preventive or post-curative manner in therapeutic procedures [04-09, 24, 29].

Or in the prescription of medicines and in the provision of public health services, mainly in the SUS network [32]. COVID-19 has its transmission similar to other viral forms of influenza in the world, in short [23, 24, 25], it occurs through human-to-human transmission and the aggravation occurs usually according to the patient's previous clinical and immunological conditions, which induces the main worsening such as severe viral pneumonia [24,25].

And in Brazil, as in other countries, severe pneumonia leads to death and its frequency increases in patients over the age of 60 years after the initial infection period [24], however, death is largely related to the underlying health of patients and that is why we have highlighted the need for continuous monitoring of patients with COVID-19 mainly as historical as chronic diseases [23, 24, 29, 31].

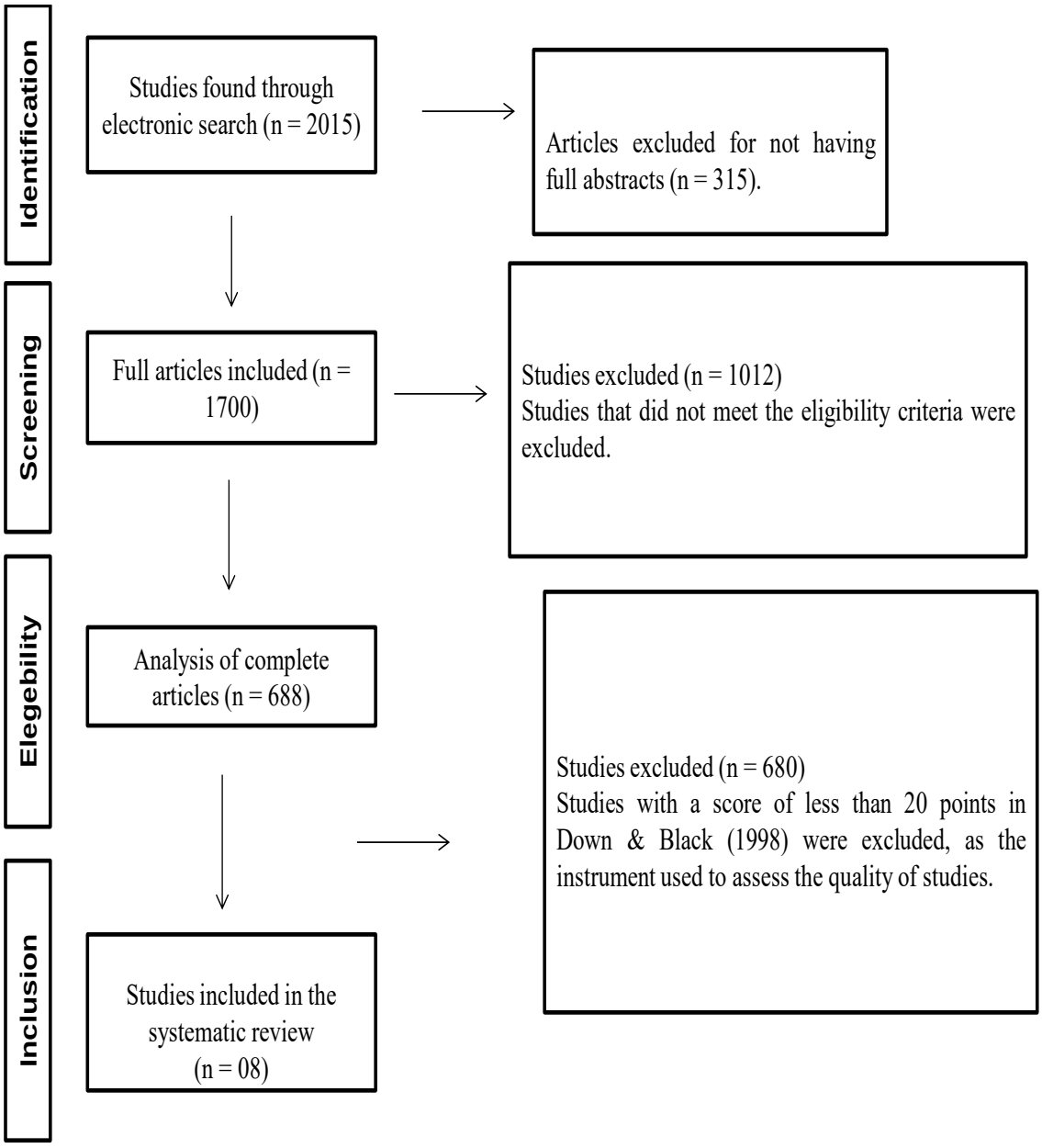
Monitoring is possible because the patient with COVID-19 maintains a constant of symptoms, such as, high fever ($\geq 38.0^{o}$ C), fatigue, non-productive cough, dyspnea and diarrhea [23, 24, 25].

Therefore, the guiding question of this systematic critical analysis of the use of new technologies applied to the Brazilian health system is: How to use new technologies in health in order to monitor patients

with COVID-19 remotely in SUS? Therefore, this study aims to analyze the importance of new technologies in the treatment of COVID-19 and, thus, promote the information of technological data in the Brazilian territory.

METHODOLOGY

Figure 01 - Flowchart of the selection process for studies included in the systematic review (PRISMA).



The studies chosen to be included in this short systematic review on the first level were the studies that used new technologies such as monitoring in the treatment process and caring for patients with viral diseases like COVID-19 on the second level. The authors used the filtering of the studies on the respective platforms. According to its security base, in this case, PubMed, Medline, Cochrane and EMBASE (Elsevier and Lancet) [24]. In order to achieve a meaningful sample, we use combinations of keyword groups. The first research group included "New Technologies", "", "E-health", "telemedicine", "telehealth", "remote

monitoring", "Security mechanism" and "Personalized Health Care" which used the Boolean operators "OR", "AND" and "AND NOT". In the second research group, the terms "Network mechanism", "priority" and "serious" "COVID-19" were included. In the third research group on the platforms mentioned above, only the terms "Profiling mechanism" and "Coronavirus" were included. The selected publications included original articles, pre-proof with acceptance, from 1995 to July 2020 (Figure 01) and without language restrictions. 2015 references were identified in four databases or repositories of scientific evidence. We used the "Rayyan - QCRI" manager for initial screening of titles and abstracts and removal of duplicate articles in the bibliographic survey, carried out by two reviewers to perform the analyzes of the included studies, using "artificial intelligence" using R-Studio [24, 25]. At the end, eight primary studies remained that supported the conclusion of this short review of critical analysis (Figure 01).

Table 01 - Identification and classification of the methodological quality risk of the included studies according to Down and Black (1998).

Article Identification	Reporting (0 – 10)	External validity (0-03)	Internal validity – bias (0 – 07)	Confusion - bias of selection (0-06)	Power (0 – 5)	Total score
Fengou et al. (2013)	10	02	04	04	00	20
Burckel et al. (1999)	10	03	04	03	00	20
Ali et al. (2019)	10	03	05	03	00	21
Júnior et al. (2017)	10	03	05	04	00	22
Cantarino et al (2016)	09	03	04	05	00	21
Lee et al. (2020)	10	03	04	03	00	20
Lima et al. (2016)	09	03	04	05	00	21
Rosen et al. (2016)	10	02	04	04	00	20

SOURCE: SARA, H. D.; BLACK, N. The feasibility of creating a checklist for the assessment of the methodological quality both of randomised and non-randomised studies of health care interventions. J Epidemiol Community Health. v.52. p.377–384. 1998.

RESULTS

Database used in Brazilian public health in the care of patients with viral diseases such as COVID-19

Health knowledge through the use of e-health technology mainly in the interdisciplinary area has been influenced by several scientific actions in the field of technology and engineering [01-09].

With the pandemic of COVID-19 it was possible to verify the possibility of health services anywhere at any time, new technologies with personalized services and mobility of services and context awareness have been adopted by the practice in the treatment and care in modern Brazilian public health [12-17].

Coronavirus required personalized treatment at low cost and efficient patient monitoring. The Brazilian public health system has an ubiquitous action and has been changed with the actions in the pandemic of COVID-19 [13-23], paradigms have been broken in the provision of health care and treatment mainly in the use of platforms with the use of e-Health in the prevention of diseases serious viruses like COVID-19 [07, 19, 21, 25].

The Brazilian Unified Health System stores and manages databases with information from the general population. These platforms serve as a database which can be classified as follows: epidemiological (Disease Information and Notification System - SINAN, Mortality Information System - SIM) and are generally used for surveillance and evaluation in research for the purpose of approach the public on health issues as well, as in the administrative profile through the outpatient system [04-09], the SIA-SUS and the hospital information systems (SIH-SUS) with the use of new technologies and capable of accounting for production control in the services provided in the SUS network and currently clinical platforms such as the FIOCRUZ network that are used to store clinical data on patients for future reference in clinical research. Some government platforms can manage, as well as, demographic and socioeconomic characterization of the Brazilian population [03-08]. The Brazilian public health system works with the Social Ministry to manage the database through the maintenance and development of electronic databases, the well-known CadUnico or unique registry for the purpose of rendering accounts in the Brazilian social service [03-23].

In Brazil, these databases are used in combinations of others for the purpose of studying social determinants and in order to evaluate public health policies applied in Brazil. Since 1947 [21-26], the World Health Organization has been monitoring the activity of influenza viruses and other viral diseases such as SARS-Cov or Coronavirus through a network of viral identification laboratories known as the “Influenza Surveillance Network (GISN) [23-32].

However, in 2011 the activity of this virus, either influenza or Coronavirus, was changed to a global influenza surveillance and response system (GISRS) [22-32]. This international data network aims to monitor the evolution of viruses such as influenzas or coronavirus and provide information that supports the recommendations of the World Health Organization for the main laboratory diagnostics, vaccine development, antiviral susceptibility and risk assessment and thus establishes a global alert mechanism for the emergence of viruses with pandemic potential [24-30].

Brazil has been a part of GISRS in recent years, through three NIC laboratories accredited by WHO, in this case, Virology Laboratory of the Evandro Chagas Institute of Pará (IEC/PA) [04], the Respiratory Virus Laboratory of the Instituto Adolfo Lutz de São Paulo (IAL/SP) and the Laboratory of Respiratory Virus and Measles of the Oswaldo Cruz Foundation of Rio de Janeiro (Fiocruz/RJ) [04-06]. And so, the first two laboratories are recognized by the National Public Health Laboratories System (Sislab) as regional references, while the last is considered a national reference for influenza in Brazil [24, 25].

These new data technologies used by the Brazilian Unified Health System SUS through virology surveillance is able to identify viral circulation in relation to type and subtype, its correlation with regional

and global standard as well as describe antigenic and genetic characteristics to monitor antiviral sensitivity in Brazilian territory [04-06, 21, 26]. And with the help of "Artificial Intelligence" it is possible to develop proactive actions, with improvement in the quality of life of the Brazilian citizen in concrete circumstances in the control of pandemics or epidemics, delivering a personalized treatment and care service at the right time, place and right time, without time or location limitation [04-08, 21-28].

However, in Brazil, the paradigm of the use of new technologies encourages individuals to have a normal life regardless of any viral or other health problems [21, 23]. Therefore, the use of technologies in Brazilian health requires innovative practices that will be in accordance with the need, habits, preference, perspectives of the individual in a real way, the life condition, their needs and habits, preference and perspectives of this related individual it peculiarity. New technologies are not able to direct health practice with omnipresent perspectives in care and treatment centered only on medical practice [30, 32].

Essentially, the use of new health technologies such as e-health is conventional, the presence of consolidated frameworks in the interdisciplinary framework [34]. This knowledge focuses on the creation and delivery of applicable e-health services within the limits of Brazilian public health units [35]. The e-health structures in Brazil must develop patient-centered, that is, the central entity (actor) of the e-health domain and e-health must support health professionals in an interdisciplinary way when accessing any information and means that can help to cope with the patient's illness situation accompanied by a viral disease such as COVID-19 [27-32]. The Brazilian e-health structures have guaranteed fast and secure access to the electronic health records system independent of the doctor and its specific locations [32-35]. However, there is a paradigm in the inclusion of technology that considers the patient to be the central entity of the e-health domain [24-32]. The patient is any individual who needs temporary or continuous assistance from a health professional, be it a nurse, nutritionist, psychologist or physiotherapist and others [34, 35]. A health system with an open domain allows for greater incorporation of different personalized health services [35]. And to realize a structural architecture in reliable, fast and economical platforms with implantation of e-health services in networks based on the IP of notebooks or cell phones is to propose and build network mechanisms for sensors, profiles and security mechanisms in order to improve the quality of data and encourage the adhesion of states that do not yet use the e-health system [33, 34], or at least stimulate the data interface against other systems in order to reduce the workload of the health professionals involved and, thus, reduce iatrogenic actions results [35].

New technologies applied in the Brazilian SUS network - A new option for the use of mobility in data information in the treatment of pandemics

The use of new technologies such as mobile can be a certain option in the continuous use in monitoring the clinical signs of patients sick with flu-like illnesses such as COVID-19 [24, 25]. Currently, there are already several applications and accessories used in weight loss programs such as fitness that can track posture, weight, blood pressure and other signs or body displacement and also calculate calorie expenditure [04-07, 35]. And the public health system can use this technology not only as a telephone, but as an integral part of the life of the modern citizen, which benefits the monitoring of the patient, however, it is worth mentioning that the excessive use brings considerable physiological changes [34, 35]. Therefore,

accompanying and monitoring these patients through health surveillance should be inserted with an interdisciplinary look at the phenomenon of observing the signs of illness through the interpretation of the body, with the position, the frequency for the interpretation with the use of new technologies [35]. The current panorama of Brazilian public health has shown an opening for the use of new technologies and new research and, therefore, these new technologies are emerging through interdisciplinarity [33], therefore, Brazilian public health has invested in applications collectively mainly in populations with diseases like COVID-19 in order to educate a population to deal with the Coronavirus, using new technologies like Whats and SMS in the treatment through interventions to adhere to health programs, can promote health for users of the network SUS through mobile technology and its consequences brings an improvement in the quality of life and economy to the public health system [32-35].

And monitoring these patients outside the hospital system with health security and without the risk of transmitting the disease to other citizens lists possibilities in order to see public health in a holistic manner within 24 hours [23-27].

And so, the monitoring actions for intervention, health promotion can be cheaper, because the patient can use his own cell phone. Well, most Brazilians have cell phones loaded with sensors and able to record metric health activities over a 24-hour period [27-29].

The treatment of patients has become less invasive and even highly complex surgeries have used technology equipment with as little tissue invasion as possible [32].

Monitoring the patient using cell phones, for example, will allow the public health system to take more preventive care [31], as providers are given access to continuous data flows from house to house [32-35]. And when health care is more ubiquitous and mobile it becomes more accessible to rural locations for example [23-29].

However, the federal government and regulatory bodies must institute regulatory protocols in order to reach a percentage greater than 10% of patients who are treated in the Brazilian public health system and thus, a high percentage of the population can benefit from the use of technology [27]. Especially in regions where pressures on public health resources and the very high burden of viral diseases must implement innovative, low-cost solutions [28-31].

CONCLUSION

The use of new data technologies such as blood pressure, temperature or HR or RF in Brazilian public health brings a gain in resolving the monitoring of patients with COVID-19 as it incorporates resolution of more complex cases in the outpatient care itself and brings a rapid response to patient, as well as helping to save costs in the Brazilian health service.

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Semantic Integration Scale to People Diagnosis with Autism Spectrum Disorder

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SUMMARY

This study's basic aim is evaluating the Semantic Integration Scale (SIS) to give a specific complementary differential instrument in relation to information processing shape of people with autism spectrum disorder (ASD) and, therefore, facilitate the differential diagnosis of people with ASD regarding normotypic people.

A total of 376 participants have been selected between 10 and 16 age, distributed in 2 groups, 1 experimental groups formed of people with ASD= 156 and 1 normotypical control group, composed by 220 participants.

The conclusive differential analysis of the comparative level between experimental and control group, corresponding to 6 subdimensions of SIS, carried out through t-test for 2 independent samples, it´s concluded the comparative data are significantly different between both groups: experimental and control group, which allows deducing the specificity of this Scale like complementary diagnosis adapted to people with ASD.

KEY WORDS: Autism Spectrum Disorder, Diagnosis, Semantic Integration.

INTRODUCTION

The American Psychiatric Association International Classification (APA, 2013) affirm the people with ASD have perceptive- cognitive limitations that effect to processing particularities and agree that people with ASD present specific educational needs at 3 levels of intensity over 2 basic dimensions: I) interaction and social communication, and II) restrictive behavior. Well, generally, diagnosis of people with ASD, focus on specific assessment, made- up through measurement scales taken from the two APA´ dimensions, hence, Shaw & Hatton (2009) pick up the most remarkable instruments for evaluation of specific diagnostic processes of individuals with ASD.

However, Baez et al. (2020), through a review of work by Dajani, Llabre, Nebel, Mostofsky & Uddin (2016) point out the specific needs of people with ASD are better explained from structure of executive function than from behavior indices, concerning to analysis of whole cognitive processes that organize the behavior directed towards a concrete final, which has a fundamental impact along development of daily life. In their conclusions, they show precisely how people with ASD present greater limitations in executive function development activities, regarding their peers of control group formed by normotypic participants,

which affects both the acquisition of new conceptual learning and the process of recuperation and application of previously learned information, which evidence the consistency of the influence of perceptual-cognitive processes as explicative hypotheses of information processing particularities in people with ASD. These limitations of people with ASD are specified in basic needs to establish meaningful relationships and neurologic nodes between incoming knowledge and previously acquired information in memory, which generates difficulties to store semantic information in permanent memory (Zager, Wehmeyer & Simpson, 2012). These basic theoretical assumptions conclude the importance of the cognitive processes analysis that make around semantic integration of informative essence to facilitate the transfer of the encoded stimuli to permanent memory and, hence, let such the posterior information recuperation, likewise the generalization process and its application in daily practice. For this reason, it´s must the different levels of executive processing perform the information semantic integration functions, from initial perceptual-sensory process, the attribution and conceptual coding, the creation of inter-relational networks and nodes, the deed to semantic memory, the ensuing recovery and, finally, its application to practical life. Empirical studies based on perceptual-cognitive theories and executive function ease the information processing understanding in people with ASD, which verify their main characteristic is the difficulty in semantically integrating the perceived learning to get content meaningful and, therefore, mechanic and automatic learning is constituted as main learning factor. This particularity of people with ASD implies the perseverance of multiple errors throughout information processing and evident limitations over conceptual coding (Lezak, Howieson & Loring, 2004; Stelzer, Andrés, Canet-Juric & Introzzi, 2016; Ben- Itzchak, Abutbul, Bela, Shai & Zachor. 2016; Harrison, Shipstead & Engle, 2015; Lifter, Foster- Sanda, Arzamarski, Briesch & McClure, 2011; Maister & Plaisted- Grant, 2011; Walsh, Creghton, & Rutheford, 2016).

Also, in this same line of research, the specificity of the perceptual-cognitive semantic process in people with ASD has been widely studied along different explicative theoretical hypotheses, throughout: -activities on information integration in semantic memory (Tager- Flusberg, 1991), -the interaction of information processing regarding to the context (Happe, 1997) [41], -perceptual-visual integration tasks (Mottron, Burack, Iarocci, Belleville & Enns, 2003), - the activities of global information integration processes or gestalt´ theories (Hoy, Hatton & Hare, 2004). Just, therefore, there´re many studies follow based on establishing reliable scales to search specific diagnostic instruments to evaluating the cognitive processing specificity in people with ASD with advance of discriminate a specific differential diagnosis. Camodeca, Todd & Croyle (2020) analyze the investigated internal consistency reliability and criterion validity of diagnostic Scale for participants with ASD (ASDS) in sample of 120 children, 54 with ASD and 66 normotypic children. Their conclusions show significant mean differences between both groups along all scores, hence they have found specific criteria of cognitive functioning in people with ASD in relation to normotypic peers.

Asimismo, Wang, Hedley, Bury & Barbaro (2020) carried out a general search study of different recent databases (2015-2018) published about instruments to detecting the autism diagnosis. In the synoptic Table number 2 suggests different Scales it analyze the perceptual-cognitive levels and behavioral processing.

Thus, in this research study it´s quite about assessing the SIS (see Annex), developed by Ojea & Tellado (2018) and, it assessed also by Ojea & Skoufou (2019). SIS include 6 subdimensions that make perceptive-

cognitive items of semantic information processing along 5 levels of intensity to facilitate understanding of executive functioning development, from conceptual comprehension, the elaboration of conceptual categories, the creation of nodes or inter-informational links and the information recuperation, with purpose to shape an empirical study to give a differential complementary specific diagnostic instrument to assess of people with ASD, regarding with individuals normotypical group, with following general aims:

1. Assess a specific Scale to complementary differential diagnosis in people with ASD.
2. Set if there´re differences between the experimental group and control group regarding variable age and sex of participants in study.
3. Specify the differential values of people with ASD regarding normotypic group about Scale subdimensions.

METHOD

Design

This research study is based on experimental design of 2 groups, 1 experimental group formed by students with ASD and 1 control group composed by normotypical students.

Participants

A total of 376 participants have been selected between 10 and 16 years old, distributed in 2 groups, 1 experimental group and 1 control group (see Table 1). Experimental group is formed of people with ASD= 156, which 85 men, 39 from 9-12 years and 46 from 13-16 years, 71 women, 45 from 9-12 years and 26 from 13-16 years. Normotypical group is composed by 220 participants, which 108 men, 48 from 9-12 years and 60 from 13-16 years, 112 women, 48 of 10-12 years and 64 from 13-16 years.

Table 1: Participants assignment (N= 376).

Sex			Years old		Total
			9-12	13-16	
Men	Experimental group	ASD	39	46	85
	Control group	TYPICAL	48	60	108
	Total		87	106	193
Women	Experimental group	ASD	45	26	71
	Control group	TYPICAL	48	64	112
	Total		93	90	183

Study variables

Categorized variables of this study are following:

- **Group**: group type, involving of 1 experimental group (people with ASD) and 1 control group (normotypic people).

- **Age**: participants age, formed by 2 age groups, 1 group of 9-12 years old and 1 group to 13-16 years old.
- **Sex**: participants´ genre-sex: male and female.

Other variables are integrated of 6 Scale subdimensions with following designation:

- **I) Concepts**: conceptual units understanding.
- **II) Meaning**: significant reconstruction.
- **III) Hierarchization**: conceptual- categories hierarchy.
- **IV) Inter-concepts**: inter- conceptual relations development.
- **V) Nodes**: inter- concepts and categories relationship.
- **VI) Recovery**: information reminds.

Variables values

Each subdimension is quantified in 5 values (0: no deficit- 4: severe deficit) it correspond with doubles scores on Scale: 0-2-4-6-8, regarding to subdimensions items criterion around the continuous scores corresponding to SIS´ values.

Procedure

All participants have been valued with the SIS by a questionnaire carried out in different educational schools throughout: 1) participant observation and 2) structured interviews realized to trained staff of educational centers.

Data analysis

Data was found through: 1) statistical reliability of whole Scale, through the Cronbach's Alpha test, and 2) comparative analysis for group variable regarding study variables draw on *t- tests of 2 independent samples*.

RESULTS

Reliability analysis of whole Scale, found by Cronbach's Alpha (α) test, show high confidence statistical power of study: α = .832 (83.2% reliability) for 9 items integrated (see Table 2).

Table 2. Reliability Statistics (N= 376).

α	Nº of Items
.832	9

Differential analysis between both groups, experimental group and control group, was found by means of comparative *t-test of 2 independent samples*. Data indicate that, globally, significant differences are found along whole of Scale specific variables, excepting for “sex” variable, which, however, confirm this study initial hypothesis since it´s confirmed in whole Scale dynamic variables (6 subdimensions) (see Table 3).

Table 3: Independent Samples Test.

		levene's Test for equality of variances		t-test for equality of means						
		F	Sig.	t	df	**Sig. (2-tailed)**	Mean	Std. Error	95% Confidence Interval	
									Lower	Upper
Age	Equal variances assumed	102.97	.00	-5.43	37	.00	-.24	.04	-.33	-.15
	Equal variances not assumed			-5.26	299.87	.00	-.24	.04	-.33	-.15
Sex	Equal variances assumed	8.88	.00	-1.80	37	.07	-.09	.05	-.19	.00
	Equal variances not assumed			-1.80	357.35	.07	-.09	.05	-.19	.00
Concepts	Equal variances assumed	2.60	.10	-12.39	37	.00	-1.09	.08	-1.27	-.92
	Equal variances not assumed			-12.30	343,.86	.00	-1.09	.08	-1.27	-.92
Meaning	Equal variances assumed	32.13	.00	-3.82	37	.00	-.41	.10	-.62	-.20
	Equal variances not assumed			-3.97	369.62	.00	-.41	.10	-.61	-.20
Hierarquization	Equal variances assumed	51.10	.00	-2.47	37	.01	-.29	.11	-.52	-.06

	Equal variances not assumed			-2.57	369.38	.01	-.29	.11	-.51	-.06
Inter-concepts	Equal variances assumed	1.61	.20	-3.65	37	.00	-.38	.10	-.59	-.17
	Equal variances not assumed			-3.71	371.236	.00	-.38	.10	-.59	-.18
Nodes	Equal variances assumed	69.94	.00	-22.05	37	.00	-1.92	.08	-2.09	-1.74
	Equal variances not assumed			-23.81	307.48	.00	-1.92	.08	-2.07	-1.76
Recovery	Equal variances assumed	125.53	.00	-1.96	37	.05	-.23	.12	-.47	.00
	Equal variances not assumed			-2.09	335.08	.03	-.23	.11	-.45	-.01

Conclusive data is reviewed below. Regarding "age" variable, for Levene significant critical level (Sig= .00), which indicates non equality- homogeneity of variances, it´s possible conclude that experimental group and control group are differ significantly agreed to "age" variable of participants (Sig= .00, F= 102.97). Indeed, as displayed in Table 4, scores mean found is significantly lower in experimental group: mean (μ)= .59, statistical deviation (σ)= .493, regarding control group (μ= .83, σ= .374), in which, scores of students between 9-12 years old are significantly lower relative to general skills: μ= .34, σ= .476 the 13-16 years old age group (μ= .64, σ= -481).

"**Sex**" variable, with Levene significant level (Sig= .00), however, no significant differences are found in critical level rely on group way (Sig= .07, F= 8.88).

Regarding all dynamic subdimensions of Scale (6 items) was found significant differences in critical level according the group type (see Table 4).

"**Concepts**" variable, with Levene's variances equality (Sig= 10), shows significant differences between experimental group and control group participants (Sig= .00, F= 2.60). Indeed, experimental group participants keep significantly lower scores in statistical process (μ= 1.37, σ= .883) the normotypic people group (μ= 2.47, σ= .831).

"**Meaning"** variable, for Levene´s variances unequality (Sig= .00), suggests differences over significance level: Sig= .00 (F= 32.13). Likewise, experimental group (individuals with ASD) get significantly lower scores, with higher deficit (μ= 1.43, σ= .834), than normotypic peers: μ= 1.85, σ= 1.180).

"**Hierarquization"** variable, with different variances (Levene: Sig= .00), evidences meaningful differences over critical level: Sig= .01 (F= 51.10), being lower statistical mean in experimental group (μ = 1.83, σ= 9.14), than control group: μ = 2.12, σ= 1.298).

"**Inter-concepts"** variable, for Levene's variances equality (Sig= .20), points out meaningful differences to critical level: Sig= .00 (F= 1.61), with experimental group statistical mean: μ= 1.67 (σ = .937) regarding control group: μ = 2.06, σ= 1.088.

"**Nodes"** variable, of Levene´s variances no equality (Sig= .00), shows significant differential level: Sig= .00 (F= 69.94). This variable show especially important differences between both groups, in which experimental group display significantly lower scores and higher deficits (μ = .66, σ= .476), regarding control group participants (μ = 2.58, σ= 1.038).

"**Recovery"** variable, of Levene´s variances no equality (Sig= .00), exhibits differentially significant critical level: Sig= .03 (F= 125.53), with significantly lower scores in experimental group participants (μ= 2.01, σ= .755), than group control participants: μ= 2.25, σ= 1.389.

Table 4. Group differential statistics.

Variables	*Group*	*N*	*Mean*	*Std. Deviation*	*Std. Error Mean*
Age	ASD	166	.59	.493	.038
	TYPICAL	210	.83	.374	.026
Sex	ASD	166	.40	.491	.038
	TYPICAL	210	.49	.501	.035
Concepts	ASD	166	1.37	.883	.069
	TYPICAL	210	2.47	.831	.057
Mean	ASD	166	1.43	.834	.065
	TYPICAL	210	1.85	1.180	.081
Hierarquization	ASD	166	1.83	.914	.071
	TYPICAL	210	2.12	1.298	.090
Inter-concepts	ASD	166	1.67	.937	.073
	TYPICAL	210	2.06	1.088	.075
Nodes	ASD	166	.66	.476	.037
	TYPICAL	210	2.58	1.038	.072
Recovery	ASD	166	2.01	.755	.059
	TYPICAL	210	2.25	1.389	.096

CONCLUSIONS

Variables it makes up the semantic structure of analysis perceived and encoded by executive processing cognitive system give significant differences between the experimental group participants, regarding their

peers from control group. These scores are related to higher deficits and significantly lower abilities in experimental group individuals along all subdimensions of SIS. But, scores are especially different in to variable: "nodes", which link with develop of relationships between learning contents than influence specially offshore devolve of semantic information to encode over long-term memory and their consequences regarding information recuperation processes, which confirms initial hypothesis that people with ASD present highly specific particularities in information processing way, especially in relation to elaboration of semantic networks between concepts and conceptual categories, found in results of "nodes" variable.

Hence, learning process requires that information perceived can be right related to information previously learned and accessible in permanent memory; otherwise, simply, information incoming will quickly be lost. Therefore, people with ASD have needs to establishing relationship nodes of information available, which explains the need of individuals with ASD regarding recovering process learning and, thus, they exhibit deficits in processes of generalization, as well as learning adaptation to context, just like that seems that one learning made is necessary learn again every time the context is changed or slightly modified. This situation owing to mechanic processing carried out, in which it hasn´t been realized significant relational links codified of previous and coming information. Just, for this reason, scores regarding recovery subdimension are also significantly lower in people with ASD, which isn´t owing to specific mnesic deficits, but enough to specific deficits in relation to information semantic attribution process and their relationships established in permanent memory, since significant networks, themselves, it´ll deed as subsequent links to ease the information recovery learned, otherwise, we will do just mechanical process of the learning stimuli, which is very cognitively costly, which can generate, hence, important deficits for application of learnings along daily practice.

This analysis, then, allows conclude the 6 subdimensions of SIS become complementary nuclear predictors for diagnostic differential discrimination of people with ASD, regarding gather aspects derived from conceptual cognitive attribution of information incoming and existing, the creating relationships between these concepts, the grouping into conceptual categories, the attribution of neurologic links and, finally, subsequent recovery for application to everyday life. For this reason, this Scale can be accepted a valid and reliable instrument to assess the processing specificity in people with ASD; however, it´d not imply the SIS Scale envelops diagnostic process isolated in strict sense, but it´d be as diagnosis´ complementary basis further to specific diagnostic instruments, current statistically verified, such *Observation Schedule-Generic Test* "ADOS" or *Autism Diagnostic Interview- Revised* "ADI- R" *Test*; mainly, when said instruments get borderline data throughout differential diagnosis process.

For this reason, it´s needful to take attention to the diagnostic factors related to the perception- cognitive semantic dimension for specific diagnosis of people with ASD. Therefore, semantic integration is a specific nuclear criterial element to improve diagnosis´ effectiveness, in order at supporting diagnosis specific analysis, according the heterogeneity model, with main aim to decrease of basic errors in the initial evaluation processes of people with ASD, mostly, when this analysis is performed at early age.

In summary, study includes the cognitive semantic integration dimension as a differential diagnosis factor, hence the APA´ dimensions should incorporate to diagnostic process of individuals with ASD the following specific processual dimensional sequence (1 (low level of ASD)- 3 (high level of ASD), which are indicated

according to correspondence with APA´ (op. cit.) levels:

1) **Level 3**: Analysis of concept parts.
2) **Level 2**: Concepts´ partial analysis, with a tendency to establish meanings.
3) **Level 1**: Analysis with meaning of concepts, with difficulties for their categorization. Limitations to set up inter- categories relationships.

STUDY LIMITATIONS

Assessment studies require obiously great samples, which is always hardness in people with specific educational needs, therefore, it´s must keep up in this research line to generate greater reliability about ASD differential diagnostic processes. Also, this research study should be understood that SIS Scale constitutes a diagnosis complementary instrument it doesn´t replace specific diagnostic tests of ASD.

ACKNOWLEDGMENT

I want thank all participating educational centers in this research, especially the Association of Families, Professionals and Researchers of People with Autism: "TRASCOS" ASSOCIATION for their collaboration.

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ANNEX

SEMANTIC INTEGRATION SCALE (SIS)

SUB-DIMENSION 1: **CONCEPTS**

Deficits in the comprehension of conceptual units.

1.1. There´s not significant conceptual units understanding.	8
1.2. There´s concretion of conceptual units' parts.	6
1.3. There´s conceptual units' analysis.	4
1.4. Conceptual units are understood, but with tendency to subdivide units into its parts..	2
1.5. There´s no qualitative deficit.	0

SUB-DIMENSION 2: **MEANING**

Deficits for the reconstruction of meaningful concepts.

2.1. There´s no parts (units) reconstruction.	8
2.2. External help is need to stimulus reconstruction.	6
2.2. Stimuli parts reconstruction is carried out with learned relationships.	4
2.4. Stimuli parts are reconstructed as from relationships created.	2
2.5. There´s no qualitative deficit.	0

SUB-DIMENSION 3: **HIERARQUIZATION**

Deficits in conceptual- categories hierarchy.

3.1. There´s no belonging understanding.	8
3.2. There´s category construction is limited to some concepts.	6
3.3. External help is need to indicate units´ belonging level to categories.	4
3.4. There's awareness of belonging, but it´s difficult assign an unit to its category.	2
3.5. There´s tendency to concepts hierarchize in corresponding category.	0

SUB-DIMENSION 4: **INTER-CONCEPTS**

Deficits to inter- conceptual relations development (nodes).

4.1. No competences of relationships meaning between concepts.	8
4.2. Don´t creates relationships, but understands similarities and differences between concepts.	6
4.3. External help is needed to create relationships among concepts.	4
4.4. Relationships are used between two concepts if its're previously learned.	2
4.5. There´s no limitations to form relationships between two new concepts.	0

SUB-DIMENSION 5: **NODES**

Deficits to setting inter- categories relationships.

5.1. There´s no understanding relationship between conceptual categories.	8
5.2. Two different conceptual categories are understood, but it´s not able to attribute relationships.	6
5.3. External help is required to establish relationships.	4
5.4. It´s given learned relationships to different conceptual categories.	2
5.5. Relationships are created between different conceptual categories.	0

SUB-DIMENSION 6: **RECOVERY**

Deficits to information remind.

6.1. There´s information recovery, but it´s very limited.	8
6.2. External help is needed to facilitate information retrieval.	6
6.3. There´s information recovery, but from concrete concept.	4
6.4. There´s information recovery, from learned relationship.	2
6.5. There´s no qualitative deficit.	0

Source: Ojea & Tellado (2018).

Effect of Organizational Commitment, Job Stress, And Job Satisfaction on Turnover Intention

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Abstract

The purpose of this study is to find out how organizational commitment, job stress, and job satisfaction affect turnover intention. This research was conducted at PT Satya Ardhia Angkasa (Outsourcing PT Angkasa Pura II Persero) in Terminal 1, Terminal 2, and Terminal 3 of Soekarno–Hatta Airport. This type of research is included in quantitative research with a total population of all employees working at PT Satya Ardhia Angkasa located in Terminal 1, Terminal 2, and Terminal 3 of Soekarno–Hatta Airport with a Sample of 100 employees. This research data collection technician uses interviews and questioners. The analysis method uses classic assumption testing, data validity, and reality testing as well as hypothesis testing with multiple linear regression analysis techniques processed using SPSS 23.0 for windows. Based on the results of determination coefficient tests resulting in an Adjusted R Square value of 0.433 or 43.3%, this shows the effect of Organizational Commitment, Job Stress, and Job Satisfaction on Turnover Intentions. The remaining 56.7% influenced the results found in this study of Organizational Commitment, Job Stress and Job Satisfaction have a simultaneous and significant effect on turnover intentions

Keywords: Organizational Commitment, Job Stress, Job Satisfaction, Turnover Intention

I. Introduction

Human Resources (HR) plays an important role in the Company's future development. Whether or not the achievement of the Company's objectives depends entirely on the ability of Human Resources (HR) or employees in the Company. Human resources are required to continue to be able to develop capabilities proactively within the Company.

Before conducting the study, researchers also conducted a pre-survey conducted with the number of respondents 30 employees outsourcing PT Angakasa Pura II (Persero) at Soekarno-Hatta Airport. There are several reasons that emerge as the basis of their desire to move jobs. The pre-survey can be seen in tables 1, 2, 3 & 4 :

Table 1. Organization Commitment Provisional Questionnaire Data

No	Description	Strongly Disagree	Disagree	Neutral	Agree	Very Agreeable
1	Employees are happy to spend time working in the organization	23%	23%	20%	17%	17%
2	Employees are concerned about problems that occur within the Company	29%	20%	25%	20%	7%
3	Emotionally bonded	27%	30%	23%	13%	7%
4	Employees will find it hard to leave the Company	30%	30%	27%	10%	3%
5	Employees will have difficulty in life if they leave the Company	27%	23%	33%	13%	3%
6	Working at this company is a necessity	33%	27%	20%	13%	7%
7	Employees feel an obligation to be loyal to the Company	37%	23%	27%	10%	3%
8	Employees feel comfortable leaving the Company because they have been given facilities	40%	27%	13%	13%	7%
9	Holding values that are to stay true to one organization	27%	20%	27%	20%	7%

Based on the results of the above pre-survey, it appears that employees are less likely to be committed to arrogance. It is known that employees feel very disagreed as much as 40% of the time when leaving the Company because they have been given facilities and strongly disagree as many as 29% of employees are concerned about problems that occur within the Company. This indicates that organizational commitment, in general, is one of the factors that want to resign from their current work.

Table 2. Job Stress Temporary Questionnaire Data

No	Description	Strongly Disagree	Disagree	Neutral	Agree	Very Agreeable
1	Tired of working	13%	13%	22%	27%	25%
2	Personal conflicts so that it is not a working concentrate	30%	20%	23%	13%	13%
3	The company's expectations to employees are unclear	13%	17%	27%	20%	23%
4	Work is not part of it	10%	13%	23%	33%	20%
5	Relationships with superiors are not harmonious	23%	27%	33%	13%	3%
6	Unhealthy competition	7%	30%	53%	10%	0%
7	Unclear career	10%	10%	10%	23%	47%
8	Difficulty of promotional opportunities	7%	7%	20%	23%	43%

9	Employees are still considered eye-to-eye	17%	13%	23%	27%	20%
10	Company regulations are not pro employees	10%	13%	23%	27%	27%
11	Families/parents are less supportive	17%	20%	20%	20%	23%
12	Hard work is not worth the income	7%	10%	13%	27%	43%
13	Easily exhausted and lackluster because it is difficult to get time off	17%	27%	27%	27%	3%

Based on the results of the above pre-survey, it is known that many outsourcing employees feel that their career as an outsourcing employee is not clearly known as much as 47%, and employees are tired of working as outsourcing employees as much as 27%.

Table 3. Temporary Job Satisfaction Questionnaire Data

No	Description	Strongly Disagree	Disagree	Neutral	Agree	Very Agreeable
1	Job responsibilities	27%	17%	17%	23%	17%
2	Interests-based tasks	27%	27%	23%	17%	7%
3	Nice to do the job	20%	23%	33%	17%	7%
4	Salary according to ability	23%	27%	23%	17%	10%
5	The amount of allowance received by the Wage Standard	50%	17%	17%	13%	3%
6	Fair promotion policy	57%	23%	13%	7%	0%
7	Objective promotion	60%	20%	10%	10%	0%
8	Promotion based on achievements	53%	23%	17%	3%	3%
9	Boss as decision-maker	17%	17%	17%	33%	17%
10	Superiors have a firm and disciplined attitude	13%	17%	20%	33%	17%
11	The boss is fair in giving a fair assessment	20%	20%	30%	20%	10%
12	Compact work in teams	13%	17%	20%	37%	13%
13	Healthy competitive conditions	13%	13%	27%	27%	20%
14	Mutual respect	13%	13%	27%	33%	13%

Based on the results of the above pre-survey, proving that outsourcing employees strongly disagree with the percentage amount of 60% that the promotion objectively on outsourced employees at PT Angkasa Pura II (Persero).

Table 4. Data Questionnaire Temporary Turnover Intention

No	Description	Strongly Disagree	Disagree	Neutral	Agree	Very Agreeable
1	Increased Employee Attendance	20%	13%	33%	20%	13%
2	Decreased Level of Responsibility	17%	17%	23%	27%	17%
3	Employees Are More Lazy to Work	13%	17%	17%	37%	17%
4	Employee Orientation Works Elsewhere	7%	13%	13%	30%	37%
5	Employees Often Misconduct in The Code of Conduct	10%	13%	27%	33%	17%
6	Employees Often Leave The Workplace	10%	17%	20%	27%	27%
7	Employees Protest More Often Against Company Policies To Superiors	10%	10%	20%	33%	27%
8	Employees Want Fair Remuneratia	13%	13%	33%	20%	20%
9	Employee's Positive Behavior Increases Employee's Positive Behavior Differently	17%	20%	23%	23%	17%
10	Employees Have A High Responsibility for The Duties Charged	13%	13%	17%	33%	23%

Based on the results of the pre-survey above, proving that outsourced employees are lazier to work as much as 37% as outsourcing employees at PT Angkasa Pura II (Persero), and Employees More Often Protest Against Company Policies to Superiors as much as 33%. A high turnover rate indicates that things are not good. When within the organization, there is dissatisfaction among employees, many of them work to get out to other companies.

II. Literature Review

A. Organizational Commitment

According to Meyer and Allen (1991) in Luthans (2011:148), there are three dimensions of organizational commitment that will be used in this study, namely:

1. Affective commitment is a commitment based on the loss that must be felt if the employee leaves the organization. The cause may be the loss of seniority status, support for the promotion or benefits provided by the organization during this time.
2. Continuance commitment is a desire owned by the individual, based on the employee's perception of the losses he or she will face if he leaves the Company so that the individual feels the need to be connected to the Company
3. Normative commitment is the employee's feelings about the obligations he or she must give to the Company, and the action is the right thing to do.

B. Job Stress

Stress becomes an integral part of human life, including being at work. There are several factors that are potential sources of stress that can be dimensions of job stress. According to Robbins and Judge (2007: 598), these factors are:

1. Environmental Factors

   Environmental uncertainty also affects employee stress levels within an organization, just as it affects the organizational structure. Uncertain environmental factors that affect the organization a lot are economic uncertainty, political uncertainty, and technological change. When the economy is volatile, employees become worried about the future of their jobs. So is when domestic and foreign politics are volatile. Employees can become stressed for fear that their jobs will be affected by the political turmoil. Fast-growing technology, especially new innovations, could potentially replace the position of employees who have skills adopted into the new technology. Finally, stress arises among employees.

2. Organizational Factors

   The pressure to avoid mistakes or to have to complete tasks for a limited time, overloaded work, and highly demanding and insensitive bosses, and unpleasant coworkers are some examples of stress-causing factors. There are three categories for stress factors viewed from the organizational side, namely task demands, role demands, and interpersonal demands. The demands of duty related to the work of the employee himself. Design of the work (autonomy, job type, automation level), working conditions, and workspace layout. The demands of the role relate to the pressures put on an employee because of his function in the role he or she is in in the current organization. Role conflicts raise expectations that can be very difficult for an employee to achieve or meet. Interpersonal demands are pressures created by other employees in one organization. A lack of social support from coworkers and poor relationships among employees can create job stress.

3. Individual Factors

   There are three individual factors that can cause stress, namely: family problems, individual economic problems, and personality traits inherent in an employee. Marital problems, relationship breakups, and child discipline issues are examples of family problems that have the potential to cause stress. Economic problems due to high financial needs have the potential to cause stress and disrupt their focus. Some people may have an innate tendency to accentuate the negative aspects of their environment. This is a stress factor due to the personal character of the employee.

C. Job Satisfaction

Job satisfaction, according to Luthans (2011:141), is influenced by five factors. The five factors that affect job satisfaction are:

1. The work itself. The extent to which his work provides interesting tasks, opportunities to learn, and opportunities to accept responsibility.
2. Salary. The amount of remuneration received and the extent to which this is considered fair in relation to others in the same organization.
3. Promotional opportunities. Opportunity to rise through the ranks in the organization.
4. Supervision. Supervisor's ability to provide technical assistance and behavioral support

5. Coworkers. The level at which coworker is technically good and socially supportive.

D. Turnover Intention

The turnover discussed in this study is in the context of voluntary turnover. Abelson (1987 in Syria 2011:46) explains that turnover intention is an overview of the mind to go out looking for work elsewhere, as well as the desire to leave the organization.

According to Mobley (1986) in Wulan Nisa, et.al (2012:81), factors that affect employee turnover can be distinguished into two factors, namely organizational factors and individual factors.

These factors include:

Organizational Factors

1. Categories of positions. Price (1979) in Wulan Nisa, et.al (2012:81) in his research concluded that employee turnover is more common among (1) rough labor than fine labor, (2) higher skill levels among rough laborers, (3) non-managerial categories.
2. The size of the organization. Conceptually, fewer organizations are associated with not so much employee turnover, as larger organizations have more internal mobility opportunities, sophisticated personnel selection and human resource management processes, more competitive reward systems, and research devoted to employee turnover.
3. The size of the work unit. The size of the Work Unit is related to employee turnover through other factors such as group integratedness, personalization, and communication.
4. Payroll. Employee turnover is at its highest level in low-paying industries.
5. Operating Weight. The purpose of labor work here is the relationship between employee turnover and certain job traits, including routine or repetition of tasks, autonomy, and job responsibilities.

Individual Factor

1. Age. Younger employees are more likely to leave. Younger employees may have more opportunities to get a new job and have smaller family responsibilities, making it easier to work mobility.
2. Working period. Employee turnover is much more likely to be found in employees with shorter working life. Mangione (1973) in Wulan Nisa, et.al (2012:81) in a varied national study, found that the length of work was the best predictor of employee turnover.
3. Gender. Gender can have an effect on other factors, such as position and family responsibilities.
4. Education. The study of education is based largely on individuals with the same education; the meaning of education as a factor is questionable if given the large differences in the quality of education.
5. Biographical Data. According to Muchinsky and Turtle (1979) in Wulan Nisa, et.al (2012:82), most of the existing sources show that biographical data is beneficial for employee turnover forecasting.

6. Personality. According to Porter and Steers (1973) in Wulan Nisa, et.al (2012:82), people who leave the organization tend to there is a limit to personality factors, such as achievement, aggression, self-reliance, and self-confidence.
7. Interests. If a person's interests and job requirements are the same or similar, then the rate of employee turnover is lower.
8. Talent and ability. If the organization uses talent related to work, then this can be a predictor factor for employee turnover.

Based on the background of the problem, the study of theories and results from previous research, compiled as a frame of thought in this study in general, the theoretical frame of thought in this study will explain directly between variables – independent variables such as Organizational Commitment, Job Stress, Job Satisfaction and Turnover Intention as dependent variables. Here's Figure 1 Framework:

Figure I. Framework

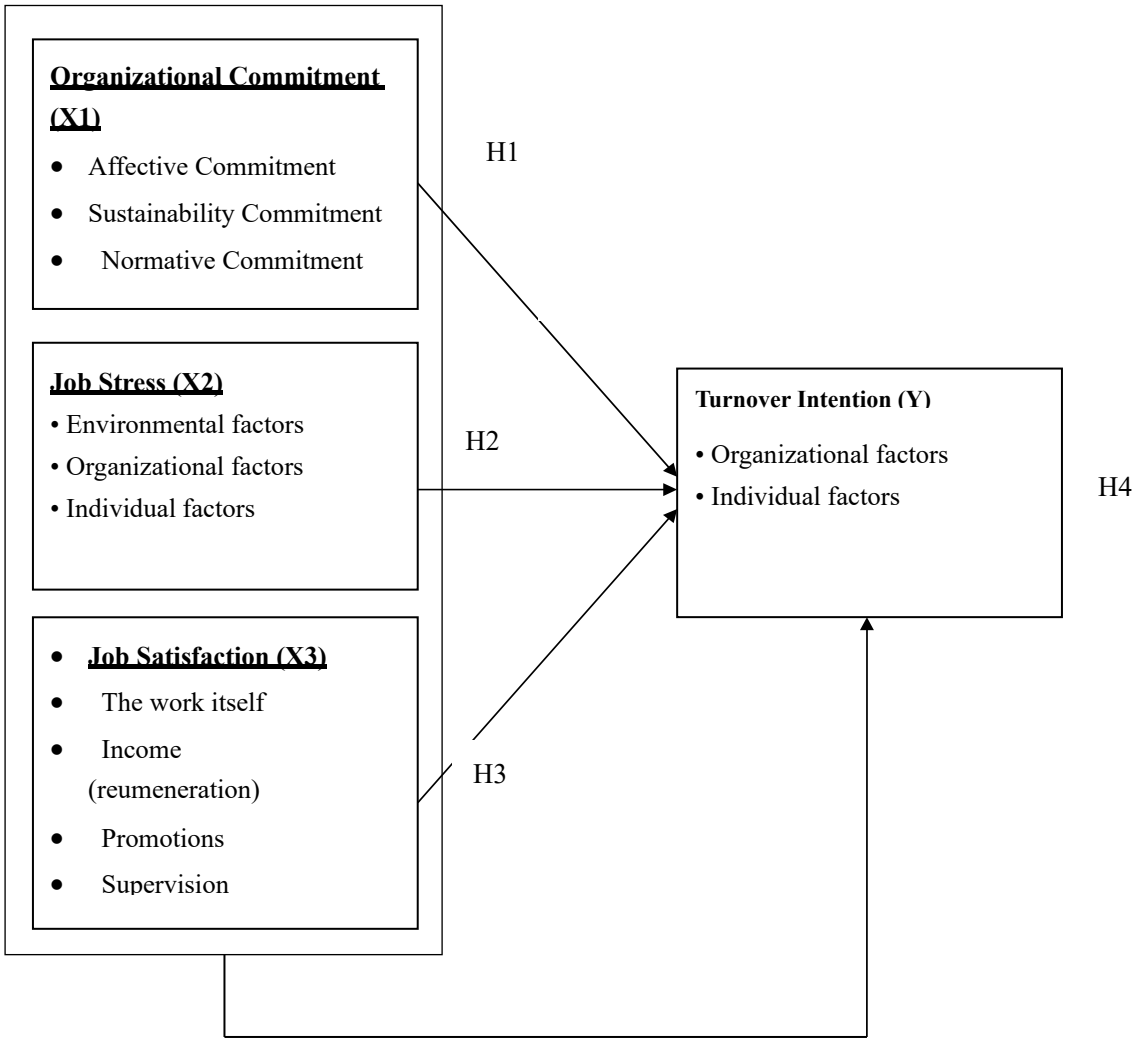


Figure I. Framework

Based on the study of the above library, the research hypothesis is formulated as follows:

H_1 : Organizational commitment affects Turnover intention

H_2 : Job stress affects Turnover Intention

H_3 : Job satisfaction affects Turnover Intention

H_4 : Organizational commitment, job stress, and job satisfaction and have a simultaneous influence on Turnover Intention.

III. RESEARCH METHODS

The research method used in this study is quantitative research in the form of data on the number of absenteeism, a number of employees, and the results of statistical calculation (SPSS) version 23 While the data source used in this study is the primary source of data obtained by direct observation and questionnaire distributed to respondents, secondary sources are obtained from the Company in its finished forms, such as the company history and organizational structure of the Company. For location and research, objects are carried out on employees of PT Satya Ardhia Angkasa (Outsourcing PT Angkasa Pura II Persero) in Terminal 1, Terminal 2, and Terminal 3 of Soekarno–Hatta Airport. The population in this study is all employees at PT Satya Ardhia Angkasa (Outsourcing PT Angkasa Pura II Persero) in Terminal 1, Terminal 2, and Terminal 3 of Soekarno–Hatta Airport and for samples using 100 employees. The data collection method used in this study is a method of interviews and questionnaires using a list of questions disseminated to respondents, namely employees at PT Satya Ardhia Angkasa (Outsourcing PT Angkasa Pura II Persero) in Terminal 1, Terminal 2, and Terminal 3 of Soekarno –Hatta Airport.

This research uses multiple linear regression analysis techniques. This test aims to look for the influence of organizational commitment (X_1), job stress (X_2), job satisfaction (X_3), and turnover intention (Y). This research data processing technique IBM SPSS Statistics program version 23. The multiple linear regression models used are by using formulas:

Y = a + b1X1 + b 2X2 + b 3X3 + e1 ..... (1)

Description:

Y = *turnover intention*

a = konstanta

X1 = Job stress

X2 = organizational commitment

X3 = job satisfaction

b 1 = job stress regression coefficient

b 2 = organizational commitment regression coefficient

b 3 = job satisfaction regression coefficient

e1 = error coefficien

IV. Results and Discussions

Based on 100 respondents of PT Satya Ardhia Angkasa (Outsourcing OF PT Angkasa Pura II Persero) in Terminal 1, Terminal 2, and Terminal 3 of Soekarno–Hatta Airport. The characteristics of the

respondent are seen from several criteria, namely age, gender, length of work, and type of education. The characteristics of respondents are described as follows.

Table 5 Employee Distribution of PT Satya Ardhia Angkasa

No	Gender	Frequency (Person)	Percentage
1	Male	73	73,00 %
2	Female	27	36,99 %
No	**Age**	**Frequency (Person)**	**Percentage**
1	≤ 25 Years	25	25,0%
2	26 - 35 Years	47	47,0%
3	≥ 35 Years	28	28,0%
No	**Working period**	**Frequency (Person)**	**Percentage**
1	< 1 Years	86	86,0 %
2	1 – 5 Years	12	12,0 %
3	> 5 Years	2	2,0 %
No	**Education**	**Frequency (Person)**	**Percentage**
1	SMA Equivalent	52	52,0 %
2	D3	21	22,0 %
3	S1	27	27,0%

A. Validity

A questionnaire is said to be valid if the question item is able to reveal something measured by the questionnaire. The validity test is done by correlating between the factor score and the total score, and if the correlation of each factor is positive > 0.196, then it is declared valid.

Table 6
Validity Test Results

No	Variable	Indicators	r Count	Description
1	Organizational Commitment (X1)	X1.1	0.329	**Valid**
		X1.2	0.341	**Valid**
		X1.3	0.781	**Valid**
		X1.4	0.847	**Valid**
		X1.5	0.203	**Valid**
		X1.6	0.248	**Valid**
		X1.7	0.198	**Valid**
		X1.8	0.540	**Valid**
2	Job Stress (X2)	X2.1	0.198	**Valid**
		X2.2	0.211	**Valid**
		X2.3	0.327	**Valid**

		X2.4	0.250	**Valid**
		X2.5	0.373	**Valid**
		X2.6	0.296	**Valid**
		X2.7	0.201	**Valid**
		X2.8	0.197	**Valid**
		X2.9	0.361	**Valid**
		X2.10	0.533	**Valid**
		X2.11	0.466	**Valid**
		X2.12	0.205	**Valid**
		X2.13	0.226	**Valid**
3	Job Satisfaction (X3)	X3.1	0.199	**Valid**
		X3.2	0.411	**Valid**
		X3.3	0.293	**Valid**
		X3.4	0.204	**Valid**
		X3.5	0.272	**Valid**
		X3.6	0.197	**Valid**
		X3.7	0.552	**Valid**
		X3.8	0.212	**Valid**
		X3.9	0.248	**Valid**
		X3.10	0.506	**Valid**
		X3.11	0.280	**Valid**
		X3.12	0.226	**Valid**
		X3.13	0.257	**Valid**
		X3.14	0.420	**Valid**
4	Turnover Intention (Y)	Y.1	0.499	**Valid**
		Y.2	0.197	**Valid**
		Y.3	0.268	**Valid**
		Y.4	0.544	**Valid**
		Y.5	0.201	**Valid**
		Y.6	0.439	**Valid**
		Y.7	0.220	**Valid**
		Y.8	0.507	**Valid**
		Y.9	0.330	**Valid**
		Y.10	0.204	**Valid**

B. Reliability

Reliability tests were conducted to measure the consistency of answers to questions given in questionnaires used as measuring instruments in this study. Results from the Cronbach Alpha statistical test, if greater than 0.60, indicating that the instrument used is reliable.

Table 7
Variable Indicator Reliability Test Results

Variable	*Cronbach's Alpha*	Description
Organizational Commitment (X_1)	0.798	**Reliable**
Job Stress (X_2)	0.770	**Reliable**
Job Satisfaction (X_3)	0.763	**Reliable**
Turnover Intention (Y)	0.749	**Reliable**

C. Normality

The normality test aims to test whether a data distribution is normal or not. The determination of normal or not the distribution of data can be done by using Kolmogorov Smirnov.

Table 8
Normality Test Results
One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		100
Normal Parameters[a,b]	Mean	.0000000
	Std. Deviation	2.67590492
Most Extreme Differences	Absolute	.071
	Positive	.043
	Negative	-.071
Test Statistic		.071
Asymp. Sig. (2-tailed)		.200[c,d]

a. Test distribution is Normal.
b. Calculated from data.
c. Lilliefors Significance Correction.
d. This is a lower bound of the true significance.

D. Multicollinearity Test

Multicollinearity assumption tests are used to measure the level of association, the closeness of relationships, or linear relationships between free variables. One of the commonly used multicollinearity tests is the variance inflation factor (VIF) testing; if the VIF value is above variable X < 10, then there is no multicollinearity.

Table 9 Data Multicholinearity Test Results

Coefficients[a]

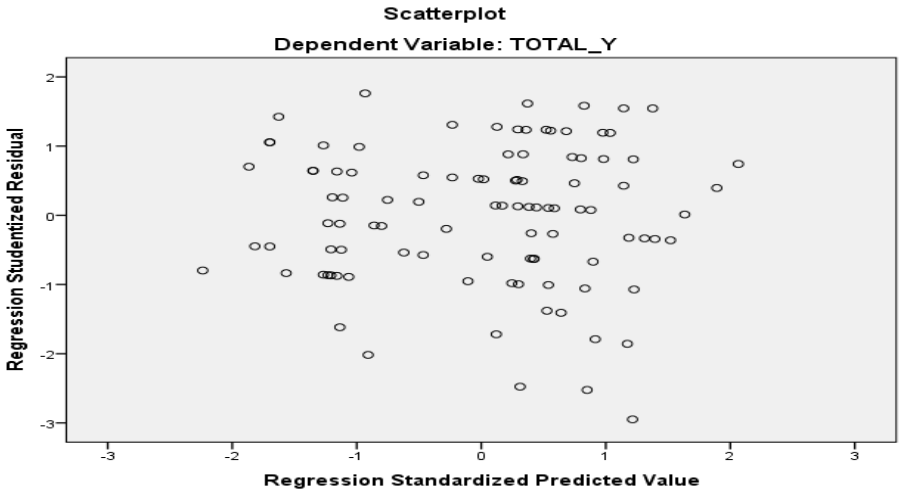
Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	37.243	6.246		5.963	.000		
TOTAL_X1	-.109	.141	-.079	-.776	.440	.985	1.016
TOTAL_X2	.011	.088	.013	.125	.900	.962	1.040
TOTAL_X3	.030	.089	.035	.343	.732	.977	1.024

a. Dependent Variable: TOTAL_Y

E. Heteroskedasticity

Multiple regression equations need to be tested whether or not the variants of residual observations are one with the other observations. If the residual has the same variant, then it is called homoskedasticity whereas if the variant is not the same, called heteroskedasticity occurs. A good regression equation is if there is no heteroscedasticity. By using the Scatter Plot, the following results are obtained:

Figure 2 Heteroskedasticity Test Result



F. Multiple Linear Regression Analysis

The data analysis technique used in this study is with multiple linear regression analyses, which are used to determine the influence between independent variables and dependent variables. The use of linear regression doubled because the study used more than one independent variable, including Organizational Commitment variables (X_1), Job Stress (X_2), Job Satisfaction (X_3).

1. R-SQUARE TEST RESULTS

The determination coefficient (R^2) essentially measures how far the model is able to explain variations of independent variables. The coefficient value of determination is between 0 and 1. A small R^2 value means the ability of independent variables.

Table 10
R-Square Turnover Intention Determination Coefficient Results

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.671[a]	.450	.433	.54355

a. Predictors: (Constant), TOTAL_X3, TOTAL_X1, TOTAL_X2
b. Dependent Variable: TOTAL_Y

Based on table 10, the known value of Adjusted R Square = 0.433. This indicates that 43.3% of turnover intention contributions can be explained by organizational commitment variables (X_1), Job Stress (X_2), Job Satisfaction (X_3) and Turnover Intention (Y)

2. SIMULTANEOUS SIGNIFICANCE TEST RESULTS (Test f)

According to Ghozali (2016) F test or regression coefficient test is jointly used to find out if together independent variables have a significant effect on dependent variables. The test used a significance level of 0.05. Simultaneous regression test (Test f) can be formulated as follows:
(1) If Sig. < 0.05 Then H0 is rejected, and Ha is accepted (significantly)
(2) If Sig. > 0.05 Then H0 is accepted, and Ha is rejected (insignificant)

Table 11
F Turnover Intention Test Analysis Results

ANOVA[a]

Model	Sum of Squares	Df	Mean Square	F	Sig.
1 Regression	5.304	3	1.768	.239	.869[b]
Residual	708.886	96	7.384		
Total	714.190	99			

a. Dependent Variable: TOTAL_Y
b. Predictors: (Constant), TOTAL_X3, TOTAL_X1, TOTAL_X2

Based on table 11 above, the known value is F = 0.239, and the value of Sig. = 0.000, while the value F of the table with df (3.96) = 2.74. Thus H0 is rejected, this variable variables of Organizational Commitment (X1), Job Stress (X2) and Job Satisfaction (X3) together have a significant effect on the Turnover Intention (Y) variable.

3. HYPOTHETICAL TEST RESULTS

The t-test is performed as a hypothetical test to determine the influence of each individual independent variable on dependent variables. According to Ghazali (2016), to calculate the t-table used provisions df = n-k = 100 – 4 = 96) = 1.99 at the level of significant (α) of 5% (error rate of 5% or 0.05) or the level of confidence of 95% or 0.95, so if the error rate of a variable is more than 5% means the variable is insignificant. The way to make decisions is:

- If probability/significant > 0.05 or t count <t table, Ho is accepted.
- If probability/significant < 0.05 or t count > t table, Ho is rejected.

Table 12 Linear Regression Results double turnover intention (Y)

Coefficients[a]

Model		Unstandardized Coefficients		t	Sig.	Result
		B	Std. Error			
1	(Constant)	2.623	3.573	.734	.465	
	TOTAL_X1	.302	.036	8.392	.000	Positive Significant
	TOTAL_X2	.112	.035	3.219	.002	Positive Significant
	TOTAL_X3	.195	.045	4.387	.000	Positive Significant

a. Dependent Variable: Turnover Intention

The achievement and testing hypothesis (H) in Table 12 is as follows:

$$\mathbf{Y = 2.623 + 0.302\ X_1 + 0.112X_2 + 0.195\ X_3 + \textit{e};}$$

1. There is a partial influence of the Organization's Commitment (X1) to Turnover Intention (Y).
   Table 12 above shows that the relationship between Organizational Commitment (X1) and Turnover Intention (Y) is significant with a t-count of 8,392 (t-count> t table (df=96) = 1.99) and a Sig value. = 0.000. The coefficient value is positive at 0.302, which indicates that the direction of the relationship between Organizational Commitment (X_1) and Turnover Intention is positive at 30.2%. Thus the H1 hypothesis in this study, stating that "Organizational Commitment (X_1) has a significant effect on Employee Turnover Intention (Y)," is accepted.
2. There is a partial effect of Job Stress (X_2) on Turnover Intention (Y).
   Table 12 above shows that the relationship between Job Stress (X_2) and Turnover Intention (Y) is significant with a t-count of 3,219 (t-count (df=96) > 1.99) and a value of Sig. = 0.002. The coefficient value is positive at 0.112, which indicates that the direction of the relationship between Job Stress (X_2) and Turnover Intention is positive at 11.2%. Thus the H_2 hypothesis in this study stating that "Job Stress (X_2) has a significant effect on Employee Turnover Intention (Y) is accepted.
3. There is a partial effect of Job Satisfaction (X3) on Turnover Intention (Y).
   Table 12 above shows that the relationship between Job Satisfaction (X_3) and Turnover Intention(Y) is significant with a t-count of 4,387 (t-count (df=96) > 1.99 and a Sig value. = 0.000. The coefficient value is positive at 0.195, which indicates that the direction of the relationship between Job Satisfaction (X_3) and Turnover Intention is positive at 19.5%. Thus the H3 hypothesis in this study,

which states that "Job Satisfaction(X_3) has a significant effect on Employee Turnover Intention (Y), is accepted.

4. Organizational Commitment, Job Stress, and Job Satisfaction simultaneously affect Turnover Intention.

Based on the results of the simultaneous significance test (test f) in table 7 above shows an F-count value of 65,240 (F-count > F-table (n=100, and k=3 = 2.74) and a Sig value. = 0.000, indicating that the Job Stress variable (X2) and the Job Satisfaction variable (X3) together have a significant effect on the Turnover Intention (Y) variable. Thus the H4 hypothesis in this study stating that "Organizational Commitment, Job Stress and Job Satisfaction simultaneously affect turnover intention" is accepted.

C. Inter-Dimensional Correlation Matrix

Variable correlation analysis is used to determine the relationship between Organizational Commitment (X_1), Job Stress (X_2), Job Satisfaction (X_3), and Turnover Intention variables.

Table 13. Correlation among dimensions

Variable	**Dimensions**	**Turnover Intention (Y)**				
		4.1 Job Attendance	4.2 Getting Lazy	4.3 Increase in Violations	4.4 Increased Protests	4.5 Different Positive Behaviors
Organizational Commitment (X1)	1.1 Employees are happy	0.449	0.557	0.481	0.449	0.381
	1.2 Caring employees	0.508	0.540	0.422	0.458	0.290
	1.3 Employees feel heavy	0.545	**0.629**	0.468	0.482	0.353
	1.4 Employees get into trouble	0.430	0.511	0.467	0.446	0.367
	1.5 Work is a necessity	0.421	0.290	0.321	0.349	0.122
	1.6 Employees have an obligation to	0.530	0.391	0.234	0.412	0.209
	1.7 Employees	0.419	0.192	0.128	0.327	0.287
	1.8 Holding the faithful	0.210	0.312	0.256	0.235	0.176
Job Stress (X2)	2.1 Tired of working	0.340	0.311	0.381	0.290	0.391
	2.2 Personal conflicts	0.321	0.417	0.290	0.391	0.192

	2.3 2.3 Employee expectations are unclear	0.238	0.501	0.353	0.192	0.312
		0.365	0.265	0.367	0.312	0.311
	2.4 Working is not part of it	0.410	0.371	0.122	0.311	0.417
	2.5 Relationships with superiors are not harmonious	0.387	0.178	0.209	0.225	0.501
		0.435	0.142	0.287	0.312	0.265
	2.6 Unhealthy competition	0.412	0.211	**0.599**	0.290	0.371
	2.7 Obscure career	0.232	0.290	0.591	0.318	0.178
	2.8 Difficulty of promotional opportunities	0.149	0.213	0.192	0.339	0.419
	2.9 Still considered eye-to-eye	0.237	0.207	0.312	0.245	0.129
	2.10 Company rules are not pro employees	0.458	0.306	0.311	0.356	0.232
	2.11 Family/parents are less supportive	0.365	0.286	0.267	0.430	0.267
Job Satisfaction (X3)	2.12 Hard work is not worth the income	0.419	0.192	0.128	0.321	**0.544**
	2.13 Easy fatigue and lackluster	0.210	0.312	0.256	0.235	0.176
	3.1 Employment responsibilities	0.122	0.412	0.333	0.126	0.349
		0.209	0.232	0.178	0.209	0.317
	3.2 Interests-based tasks	0.287	0.149	0.142	0.287	0.292
	3.3 Happy to do the job	0.290	0.237	0.211	0.290	0.276
	3.4 Salaries according to ability	0.391	0.391	0.290	0.391	0.138

	3.5 Amount of benefits received	0.192	0.192	0.213	0.192	0.229
	3.6 Fair promotion policy	0.312	0.312	0.207	0.312	0.139
	3.7 Objective promotion	0.311	0.311	0.228	0.112	0.128
	3.8 Promotions based on achievements	0.433	0.225	0.276	0.259	0.335
	3.9 Superiors as decision makers	0.339	0.173	0.301	0.126	0.266
	3.10 Boss has a firm attitude	0.236	0.189	0.308	0.331	0.389
	3.11 Fair boss	0.276	0.122	0.126	0.288	0.122

Based on Table 13, the interpretation of the correlation matrix is as follows:

1. Organizational Commitment Variable (X_1) to Turnover Intention Variable(Y)
   Based on Table 13 above it is known that the larger correlation value between the dimensions in the Organization Commit variable(X1) against the Turnover Intention (Y) variable is dimension X1.3 The employee feels heavy with dimension Y2. Start lazy work, which is 0.629, and enter into the category of strong relationship level. This explains that the X1.3 dimensions employees feel heavy in organizational commitment variables are indispensable to support increased Turnover Intention (Y), especially in the Start lazy work dimension.

2. Job Stress Variable (X2) to Turnover Intention Variable (Y)
   Based on Table 13 above, it is known that the larger correlation value between the dimensions in the Job Stress Variable (X2) to the Turnover Intention Variable (Y) is X2.8 Difficult to the chance of promising with dimension Y4. The increase in offenses was 0.599 and was in the moderate relationship level category. This explains that the X2.8 dimension of hard-to-compress promotion in the Job Stress variable is required for any increase in Turnover Intention (Y), especially in the Increased Violation dimension.
3. Job Satisfaction Variable (X3) to Turnover Intention Variable(Y)
   Based on Table 13 above it is known that the larger correlation value between the dimensions in The Job Satisfaction Variable(X_3) to the Turnover Intention(Y) variable is dimension X3.1 Work responsibility with dimension Y5. The different positive behaviors are 0.544 and enter into the moderate relationship level category. This explains that the X3.1 dimension of job responsibility in the Job Satisfaction variable is required for each increase in Turnover intention (Y), especially in different positive Behavior dimensions.

V. Conclusions and Suggestions

A. Conclusion

Based on the discussion of the above research results, it can be concluded that the Organizational Commitment Variable has a positive and significant effect on turnover intention. Then for Job Stress variables to have a positive and significant effect on turnover intention and job satisfaction variables have a positive and significant effect on turnover intention and organizational commitment variables, job stress and job satisfaction have a positive and significant effect together on turnover intention.

B. Suggestion

advice that can be given to minimize employee stress levels, then the Company should provide work that suits its field, and the level of employee workload that suits the employee's ability. The Company is expected to increase employee commitment by providing support and attention to its employees and providing employee satisfaction that can spur employee morale. Further research is expected to add variables and take samples outside the banking environment and use other models as analysis tools.

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Technology-Enhanced Learning and Teaching in COVID-19 Era: Challenges and Recommendations

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Abstract

Technology-enhanced learning and teaching methods have been in literature and for many years now. Many educational institutes all over the world have been using these methods to deliver their programs and degrees. Nevertheless, some institutes are not very keen on using technology in some disciplines, and deliver their programs in a traditional way for a number of reasons, especially if these have been successful and well-attended (i.e. popular) by students. In the current era, where COVID-19 pandemic has disrupted every corner of our life including higher education, technology has become a critical success factor to reduce the negative impact of this pandemic. Accordingly, it is now no longer an option to opt out from using technology in learning and teaching. This doesn't just refer to providing (dumping) contents to students digitally, but to facilitate learning and deliver engaging and highly interactive experience to compensate for lack of face-to-face interaction between the students and their teachers and also amongst the students themselves. The use of technology in education due to COVID-19 pandemic, however, has confronted by a number of challenges. In some cases, the focus was shifted to the contents (documents, videos…etc.) rather than interactivity and student engagement. Furthermore, the students were highly overwhelmed with contents in a short period of time, which has caused anxiety, dissatisfaction and performance issues. In this paper, examples of teaching methods based on the use of technology that are employed during the lockdown period are provided. Moreover, a number of subsequent challenges due to current situation are discussed, and recommendations for implementation and best practice are shared. Also a proposal for a flipped delivery model to move forward is provided and discussed. Anecdotal student feedback has shown that the used methods and techniques were really helpful and have boosted student learning and enthusiasm in this difficult time.

Keywords: Technology-enhanced learning; remote teaching; hybrid teaching; flipped learning; Virtual Learning Environment; COVID-19.

1. Introduction

In recent years, educational technology tools are predominantly integrated in every aspect of higher education. Today's students are digitally literate in a remarkable way, and are always online on social media and other communication applications (Al-Ataby, 2016). In 2010, the NUS (National Union of Students) has demanded form the universities in the UK to review their teaching methods to assess whether new

technologies are incorporated in learning and teaching or not. Moreover, NUS has carried out a survey after being commissioned by HEFCE (Higher Education Funding Council for England) to collect students' perspective about the use of technology in higher education. Among the outcomes of this survey are that the students believe undoubtedly that technology would absolutely improve their learning and teaching experience, and they want more state-of-the-art technology tools to be embedded/integrated in their learning and teaching, and they think their teachers need more training on the use of technology. Moreover, the students would like all the tools and utilities to be integrated and used from one place, which is obviously the VLE (Virtual Leaning Environment) or the electronic blackboard system (Al-Ataby, 2019). From the above discussion, it is evident that the students are happy for technological tools to be embedded and integrated in their learning, obviously in a planned and quantifiable manner.

In 2020, COVID-19 pandemic has impacted severely all aspects of our life, including education at all of its levels. As a way to mitigate the negative impact of the pandemic, many higher education institutions have decided to switch completely to online (remote) teaching delivery and virtual education in a matter of few days (if not overnight) (Daniel, 2020). This required heavy use of technology and high reliance on the available IT infrastructure. Because of this prompt switching to online delivery, there were a number of pitfalls and challenges. Students were overwhelmed with huge amount of contents (documents, videos), and lost the interactivity and social interaction element between themselves and the teachers from one side, and among themselves from the other side. Accordingly, lack of motivation and engagement has resulted, and many students have felt isolated, and just wanted to finish the academic year and progress to the next year with the least efforts as possible (Kandri, 2020). Assessments during the semester when the lockdown occurred and end-of-year examinations were also impacted by the lockdown, and it was a great challenge to run these in a fair and authentic way. Moreover, there were other problems and challenges encountered as a result of running everything in an online and virtual way.

In this paper, examples of teaching methods based on the use of technology that are employed during the lockdown period are provided. Moreover, a number of subsequent challenges due to the current situation are discussed, and recommendations for implementation and best practice are shared. Also a proposal for a flipped delivery model to move forward is provided and discussed. Anecdotal student feedback has shown that the used methods and techniques were really helpful and have boosted student learning and enthusiasm in this difficult time.

The paper is organized as follows:

- Section 2 provides a brief overview about online learning and teaching methods such as flipped, hybrid and blended learning methods.
- Section 3 summarises the case study used in this paper.
- Section 4 lists a number of challenges that were encountered during the lockdown period.
- Section 5 provides a brief discussion about the status of education after COVID-19 era.
- Section 6 provides the proposed flipped learning model.
- Section 7 provides recommendations to move forward.

- Section 8 provides concluding comments.
- Sections 9 and 10 provide acknowledgements and references.

2. Online Learning & Teaching

The term online learning was used for the first time in 1995, when the first LMS (Learning Management System) was developed (Singh and Thurman, 2019), although a number of references in literature sends it back to 1980. The terms online learning and e-learning are frequently used interchangeably in literature, and they both refer to the use of technology in delivering learning and teaching, where a course or a degree has a number of embedded online elements (Kukulska-Hulme, 2012).

There are a number of learning methods that are usually referred to when applying or implementing online learning. These are (Panopto, 2020, Alammary, 2019, Salmon, 2001):

a) Flipped learning, which refers to the learning that includes both online and face-to-face elements. In this learning, unlike traditional learning, the students learn the principles and concepts of the subject being taught themselves on their own time and pace using the provided resources (online material, videos) beforehand and attend face-to-face sessions to expand their knowledge or for class/group activities. In a flipped course, students and teachers highly utilize both online and face-to-face sessions. Such learning method is very useful for basic and introductory courses, but may also be suitable for advanced courses. End-of-term exams are usually carried out in person in this learning method.
b) Hybrid learning, which refers to the learning where online component is used to replace some face-to-face element of the course. The online components could be lecture sessions or even online discussion sessions that are not necessarily video-based, but could be textual (e.g. wiki pages or chat rooms). These online components could be carried out in a synchronous (real-time) or asynchronous way. Hybrid learning is useful for students who live far away from the campus or study part-time because they are busy with their work. Face-to-face component in the hybrid learning is useful to promote class community, social interaction and prompt and face-to-face feedback, the things that are missing in fully online course. End-of-term exams are usually carried out in person in this learning method.
c) Blended learning, which refers to the learning where face-to-face classes are usually accompanied by online resources and material, so the online component is not meant to replace the face-to-face component but rather to complement it, so the provided online resources are used as supplementary material to the face-to-face lecture sessions. Students can go through the online material at their own time and pace, as many times as they want, and they usually perform better in such learning environment. Although there are differences between the two, blended learning and hybrid learning terms are sometimes used interchangeably. End-of-term exams are usually carried out in person in this learning method.
d) Distance or remote learning, which refers to the learning that is carried out completely in an online

(virtual) way, without any face-to-face element. All course material and documents are provided on the VLE, and the lectures could be delivered in a synchronous or asynchronous way. Depending on the class size, teachers can virtually meet their students in groups or in one-to-one basis incase this is needed. End-of-term exams are usually carried out remotely as unattended open-book tests or as closed-book tests by but with online proctoring with a webcam for real-time monitoring of the student while carrying out the exam. The end-of-term exams could also be replaced by coursework components.

As can be seen from the learning types discussed above, each type has its own advantages and disadvantages. Employing one of the above types depends highly on factors such as student learning preferences, year of study, class size and also the available resources and infrastructure. Moreover, discipline/program of study could also dictate the learning style. For example, medical and engineering disciplines require hands-on work that is usually carried out in laboratories, so the physical presence and face-to-face interaction are unavoidable.

During COVID-19 pandemic, and due to lockdown measures, the majority of universities have switched to completely online delivery without any face-to-face element. End-of-year exams were carried out predominately as open-book tests. With the reduction in the lockdown measures, universities are expected to incorporate a face-to-face component, hence moving to a hybrid or flipped learning styles, taking into consideration social distancing measure (Marinoni et al, 2020).

3. Case study

In this section, an example of a course delivered during the lockdown period will be provided. The course is a third year (final year) module, with a class size of about 150 students. The cohort was very multicultural, with home (UK), EU, Chinese and Middle Eastern students. For the first seven weeks of the second semester, the module was delivered in the standard format, which is basically a blended learning, with face-to-face lectures and problem class sessions, plus additional online material such as supporting documents and videos. The last face-to-face lecture was delivered on 13th March 2020, after which a complete lockdown was imposed in the UK. Recorded videos for the remaining lectures were made available immediately to the students on the VLE. Here are some examples of the methods used in delivering the remaining material of the module during the lockdown:

3.1 Online (live) sessions

When it comes to carry out video conferencing, web conferencing, webinars and online (live) lectures to students, there are many tools available for that. Cisco Webex and Skype were among the tool that have been used for long time to carry out live meeting and lectures. However, during COVID-19 pandemic this year, two video applications have been remarkably instrumental; these are Zoom from Zoom Video Communications and MS Teams from Microsoft. The main reasons behind this are they are both very simple to use (user-friendly) and are integrated with most the available VLEs (CANVAS in particular).

Setting a meeting up by both applications is very straight forward and joining it is even simpler. They are both cross-platform (Windows, Mac OS, Android or iOS) and their free versions provide good flexibility and features, and more capabilities and features can be obtained with the licensed versions. Most of the universities have had a license for Microsoft products, so obtaining MS Teams application was like adding one more software tool to the available suite. Many universities obtained Zoom license during the lockdown period as an additional level of flexibility to the academic and professional staff. There are other options that are either free or cost-effective, such as YouTube live stream, but they are more suitable for the public domain rather than academia.

For the module used in this case study, Zoom was used as a tool to run Q&A and discussion sessions. As mentioned before, when the lockdown occurred, recorded videos for the remaining lectures were made available immediately to the students on the VLE (which is Blackboard). The students were informed that if they have any questions after watching the videos for the lectures, then they can join a timetabled live Q&A session, and the questions will be taken on first-come-first-served basis or on alphabetical order if many students turn up at the same time. Also, as another use of live sessions on Zoom, problem class sessions were carried out. It was found that this is much more useful than organizing live lectures, as many students won't be able to join for several reasons, or may not be interested to join if the session is just a lecture session where student questions can't be taken. Moreover, when it comes to lectures, students usually want to watch a recoded video at their own time and pace. This was also confirmed by anecdotal student feedback.

3.2 Virtual office hours

Besides the timetabled live sessions, students seemed to prefer drop-in sessions, where they can turn up and ask general questions about the module that are not necessarily linked to a specific lecture or topic. Weekly virtual office hours on a specific day/time of the week were provided to students using Zoom. Although the number of students joining these Zoom meetings was small, they were very useful to the involved students. These Zoom meetings are meant to be one-to-one, so the students can speak openly to the teacher if they have any problem, besides asking questions about the subject. The students are advised to book a slot in the virtual office hours before the designated day/time, yet they can still join (if possible) in case they miss to book a time slot.

3.3 Online Q&A sessions and Discussion Boards

Although online (live) sessions and virtual office hours offer a very good chance for the students to interact with their teacher in a video call format, a number of students would prefer textual interaction. This could be due to a number of reasons such as language barriers and reluctance to show faces or part of their homes in the background of the video call. Accordingly, they may prefer to send a written question online (anonymously) and get a reply immediately or after few minutes. This is very similar to sending an enquiry by an email and waiting for a reply, but in this case, both the question and the answer appear at a dedicated page in the VLE (called Q&A or Student Questions page) where the students can find the question that

they've sent along with its answer. The teacher is going to be available to answer student questions on spot (if possible) or within a short time window, depending on the availability. A link for this tool is available in the VLE, and the students need to click on that link to open the tool and send their questions anonymously. With large cohorts, and closer to the final examination day, a high number of questions are expected to come to the teacher, which obviously creates a high workload. There is another tool that is also useful in this regard, which is the discussion board, where students can also send questions (anonymous or with their name), but they expect the answers to come from their peers rather than their teacher, who can also answer the questions in case other students couldn't. The discussion boards offer a good environment for student collaboration and promote peer-assisted learning concept, and it is a feature that is available in most of the VLEs.

3.4 Simulation tools

With remote learning, simulation tools are going to be very useful to help in student understanding. The students usually struggle with subjects that are abstract theoretical concepts, and as a way to simplify these, simulation tools play a very vital role. Moreover, modules with practical lab components have lost their edge (the hands-on experience) because of the lockdown, and in this case simulation software and tools are very instrumental. Obviously, nothing replaces the practical hands-on experience gained in the laboratories while students carry out experiments, but if the learning outcomes of the practical exercise can be (partially) met with simulation tools then it could be acceptable as plan B until things return back to normal.

A large number of simulation tools exist in many disciplines, and their cost and difficulty vary. In engineering for example, there are many tools and software packages, depending on the engineering field. MATLAB (which is licensed software) is one useful tool that offers a very intuitive simulation environment (Simulink), and it has been used in this case study. It was used in the recorded videos and also in the problem class sessions to explain concepts and provide practical flavor to the information. The students were highly engaged in these sessions and used the tool to test all the examples provided in the lecture notes.

Another useful tool used in this case study was a free simulation application called GeoGebra, which is an interactive mathematical, geometrical, statistical and calculus application that is intended for mathematics, science and engineering disciplines. Every system described by mathematical equations can be simulated using this tool. The application is cross-platform and can be embedded easily in most of the available VLEs (e.g. Blackboard and CANVAS). It is a free tool, so no licensing is required. Depending on the complexity of the system or circuit to be simulated, development time and effort vary. There are a large number of models available already in the application itself that can be used by teachers and students, but for new or advanced models, one needs to create the model completely from scratch. In this case study, many GeoGebra models were created to help understanding the main concept of the module.

3.5 Online Quizzes (formative and summative)

To assess students understanding of a certain topic, tests are needed. The easiest way to do this nowadays

is to have an online test on the VLE which provides prompt feedback about understanding. These online tests could be just formative quizzes, or assigned a certain weight from the overall module mark. The tests are synchronized with the lectures and the timetabled live sessions. There are pre-session and post-session online tests, where student understanding can be assessed and gauged. The students are instructed to watch the lecture recording, then carry out the online pre-session test, then join the online session and carry out the post-session test afterwards. By doing this, the students will have full picture about their understanding, the revision they must do and the additional support they need. It was found that without a formative assessment, homework or a test, the students will become self-complacent and lose focus, so they don't revise and leave everything to till the last minute. A small number of online tests are going to be summative and assigned a weight from the module overall mark in the form of an assessed assignment or task, and the rest of the tests will be formative to provide feedback for the students about their learning.

3.6 Personalized end-of-term examination

One of the most critical challenges that have resulted due to the unexpected lockdown in the middle of the second semester of the academic year was how to carry out end-of-term examinations. Some schools in many universities have decided to cancel these examinations and consider the year as just a pass/fail year or even to pass everyone. While there may be valid reasons for these decisions, other schools decided to go on with end-of-year examinations. In this case study, open-book examinations were used, where every student was given 48 hours to submit the exam through the VLE because the students were in different time zones, and could have problems to connect to the Internet, so to accommodate these issues, two days were given for submission. There are many (known) problems with unattended open-book examinations, such as authenticity, so measures must be taken. One of the measures is to have a personalized end-of-term examination, and depending on the subject type, this can be done in different ways. The idea is to create as much variety and personalization as possible amongst the students when they do the examination to improve exam authenticity and reliability. In this case study, the module has many numerical elements, so numerical questions can be linked to the student ID, so in each question, one or more variable can be linked to the numbers in the student ID (e.g. the last digit in the ID, the last two, three…etc.). For non-numerical questions, other ways could be attempted, such as if the student ID is within certain range then the students must answer specific questions in exam paper, or answer different set of questions, and so on. These ways obviously won't guarantee 100% exam authenticity but it'll definitely help somehow.

4. Challenges

There were many challenges encountered in higher education during the lockdown period (IAU, 2020, Langella, 2020). In this section, the main ones are briefly discussed.

4.1 Infrastructure and Technology

It is obvious that any technology-enhanced learning method requires the right IT infrastructure and the platform to be implemented. Determining the required technology infrastructure that was needed during the lockdown to deliver lecturers and support the students remotely is out of the scope of this paper. Both

the universities and students must have the required IT infrastructure so that online (remote) delivery would be possible and successful. During the pandemic, a number of infrastructure issues were evident, especially with the students such as slow or unstable Internet connection. Accordingly, there must always be an alternative (plan B) provided to the students. For example, if the student can't join a live lecture because of a slow internet connection, then the lecture must be recorded and made available in the VLE for the students to watch later. Also, recorded lectures must be made downloadable so that the students can download when they are connected and watch these offline. Submitting an exam or coursework through the VLE must be backed by an alternative method (e.g. by email or through alternative website) in case the VLE is not accessible so that the students won't miss an important deadline.

4.2 Student lack of participation and engagement

An obvious downside of remote online teaching is that many students find it unlively, so after joining one or two live sessions or watching recorded lecture videos, they will soon get bored and just lose interest. Unless teachers find a way to engage the students and grab their attention back, they will be disengaged for the rest of the semester or the year.

4.3 Struggling in silence students

A good number of students join live sessions and watch all the recorded lectures and go through all the documents, yet they are not accustomed with this new way of delivery but used only to face-to-face delivery. So, although they get themselves busy with the available online resources, yet they just can't grasp the topics and information. Moreover, many students struggle because of personal issues during the lockdown period due to economical, health or psychological reasons. As mentioned in the case study above, students were offered virtual office hours, yet many of them decided to struggle in silence and not to speak out to their teachers about their problems because they are either shy, or just don't want to speak about their personal problems to a person outside their family circle.

4.4 Assessment fairness and authenticity

As mentioned in the case study above, measures were taken to personalize the end-of-term examination to improve authenticity and reliability. Although these measures are useful, they won't guarantee 100% exam authenticity, though. There will be collusion cases and academic integrity breaches when carrying out open-book examinations.

The other alternative for personalization is proctoring, which is an online invigilation, so the student is watched while he or she performs the examination at home or anywhere else. The student needs to sit in front of a PC which is equipped with one or more active cameras and relevant software and start the examination. There are three types of proctoring (Kaplan, 2020):

a) Subsequent proctoring, where an invigilator (or a proctor) can check if there was any breach later on after the student finishes the exam. The software records video shots or photos at random times for the student during the exam and send these to the examination team to go through.
b) Live proctoring, where a proctor invigilates a number of students remotely in real-time through

their cameras while they sit for the examination.

c) Automated proctoring: where computer software or an artificial intelligence (AI) tool automatically detects any breach during the examinations.

Each type of the above has its own features and limitations. There are many products available to carry out proctoring, such as Proctoru (http://www.proctoru.com) and Oxagile (https://www.oxagile.com/competence/edtech-solutions/proctoring). Even remote desktop solutions such as Teamviewer can be used for proctoring with some customization. Licensing/pricing of such products obviously differs depending on the features and capabilities, but in general it is costly.

Although proctoring offers a solution for exam authenticity, there are many associated issues and challenges. For example, for an international cohort, there is a time-zone problem when setting up a timed examination for the full cohort. Also, there will be many technical problems as far as the students are concerned such as connection and electricity loss, where proctoring process will be interrupted (this could be intentional, though). Moreover, with large cohorts, a large number of proctors are required because each proctor can manage a certain number of students at one time. For these reasons (and others), many universities have decided to opt out from proctoring.

4.5 Time-zones

When the lockdown was imposed, many international students decided to return back to their home countries. This has led to a problem when it comes to scheduling live lecture sessions and timed examinations because of the different time zones. Alternatives must be suggested to mitigate this challenge.

4.6 Accessibility needs

Another challenge that was experienced during the pandemic period and lockdown is how to support students with special needs. Revision material must be provided in different formats to support students with accessibility requirements. A number of VLEs (e.g. CANVAS) provide good accessibly check for the material that is uploaded to course pages and provide guidance on how to improve accessibility. As an important requirement, all recorded video material and live sessions must be captioned (subtitled). This can be done using the VLE itself (e.g. CANVAS studio), Microsoft Stream, Microsoft PowerPoint or even YouTube. For captioning live videos, Microsoft Teams is very powerful (built-in feature). Zoom can also do this directly or with a third-party tool. Automatic captioning is obviously very convenient but lacks accuracy sometimes, especially with when technical terms (jargon) are used a lot. The teacher needs to edit the transcript file of the lecture and correct the mistakes (manually) to have accurate subtitles, something that adds additional workload on the lecturers in case there is large number of videos to check.

5. Beyond COVID-19 Era

The effect of the pandemic and lockdown on education (and other aspects of life) will have a long term ripple effect that will substantially change the way educators used to carry out their work (Marinoni et al,

2020). After this pandemic ends, educational institutes shouldn't just restart and resume normal business but to rethink the entire learning and teaching process. After this unfolds:

a) We are going to have large number of distance learning tools,
b) Students will have developed remarkable independent learning skills,
c) Teachers will have developed outstanding skills in using technology-enhanced learning tools,
d) Students and teachers will have developed adaptation skills and will be more patient.

These gains, skills and attributes must be utilized when redesigning courses and programs in the near future (UN, 2020). Also, teachers, as well as students, must be supported more and their needs must be addressed (Reimers, 2020). Moreover, flipped and inclusive learning will be the buzz words in the near future.

6. Proposed Flipped Model

In this section, a proposal for a flipped delivery model is provided and discussed. The model is shown below in Figure 1. The proposed model is based on the concept of flipped learning model.

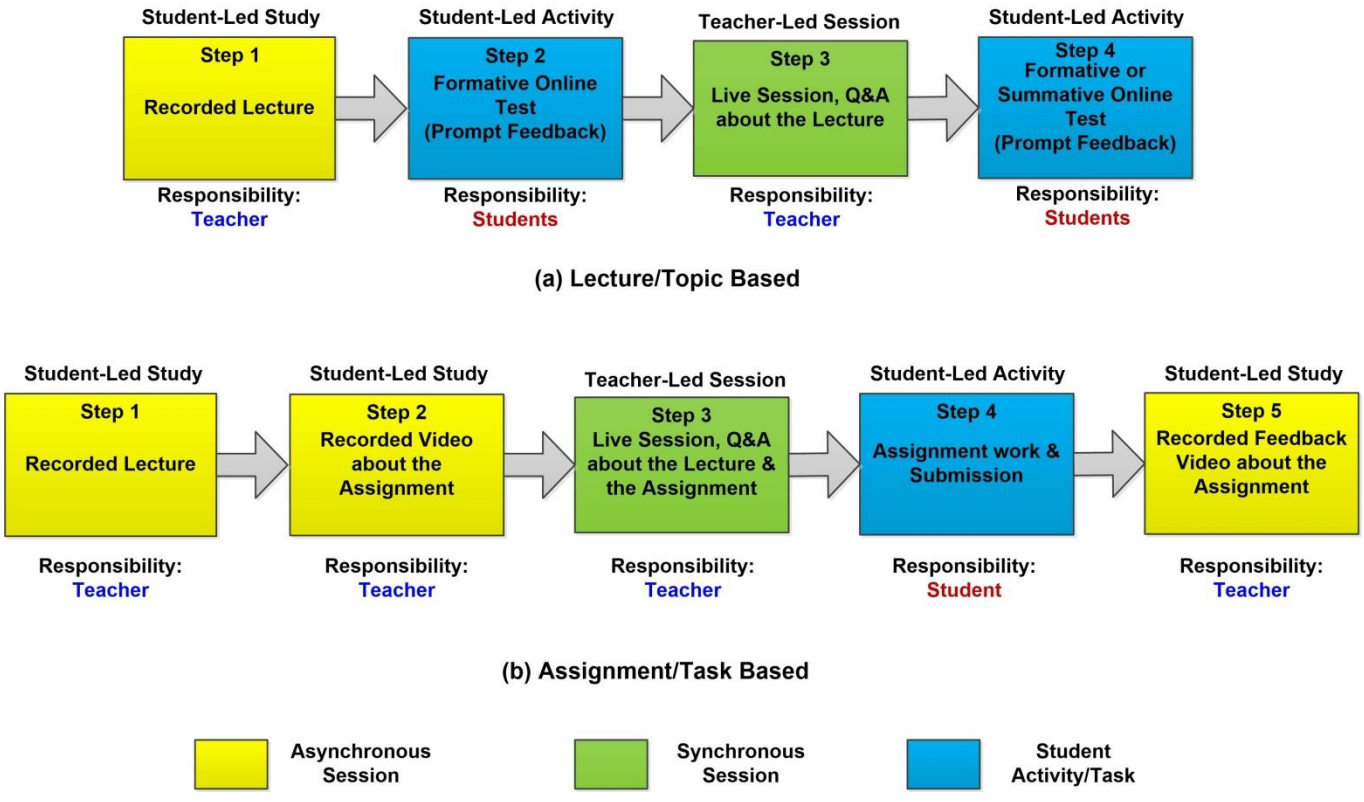

Figure 1. Proposed Flipped Teaching Model

Figure 1 (a) shows the proposed model that is based on a lecture or topic, while Figure 1 (b) shows the proposed model that is based on an assignment or task.

The lecture or topic based model (Figure 1 (a)) is a 4-step model that is designed around the lecture or the

topic taught. The model is described as follows:

a) Step 1: The teacher prepares a recorded lecture about the topic to be taught. The length of the lecture should not be long (about 20 to 30 minutes maximum). The students must watch the video of the lecture before going to Step 2.
b) Step 2: The student should carry out a formative online test to assess their understanding after watching the lecture. The test provides a prompt feedback about student understanding, and at this stage, the students will know if they have any weakness in understanding the lecture or the topic, and they will generate relevant questions about the material.
c) Step 3: The teacher carries out live Q&A session to answer students' questions and enquires. This session is timetables so that the students prepare their questions. After this session, it is hoped that most of the students understand clearly the topic discussed before.
d) Step 4: The student should carry out another online test that could be formative or summative. The test provides a prompt feedback about student understanding. The students at this stage will know if they still have any weakness in understanding. They can approach the teacher during the virtual office hours about their questions.

The assignment or task based model (Figure 1 (b)) is a 5-step model that is designed around an assignment or task to be assigned to the students. The model is described as follows:

a) Step 1: The teacher prepares a recorded lecture about the topic to be taught. The length of this lecture should not be long (about 20 to 30 minutes maximum). The students must watch the video of the lecture before going to Step 2.
b) Step 2: The teacher prepares another recorded session about the assignment/task to be assigned to the students. The length of this session should not be long (about 20 minutes maximum). The students must watch the video of this session before going to Step 3.
c) Step 3: The teacher carries out live Q&A session to answer students' questions and enquires about the lecture and the assignment/task.
d) Step 4: The student should carry out the task or assignment and submit it before its deadline.
e) Step 5: The teacher must mark the task, and after finish all marking, he/she must prepare a feedback video, which provides generic feedback about students' attempts to improve the work in future assignments and tasks.

The model above assumes that there will be no face-to-face interaction between the teacher and the students. If, however, there is a possibility for face-to-face sessions, then the synchronous sessions (green boxes) in the above model will be carried out as face-to-face rather than online (live) sessions, provided that social distancing measures are taken into considerations.

The proposed model will be applied in the academic year 2020/21, and student feedback will be collected afterward, and the results will be published in a future paper.

7. Recommendations

This section offers recommendations for educators to move forward.

7.1 Plan the delivery and always prepare

Teachers can't just turn up and teach under the current circumstances. Even well-seasoned teachers and educators found the lockdown situation very challenging when it comes to gauge their delivery and engage their students. This necessitates the need for proper planning and preparation before delivering lectures to students. The starting point is obviously the VLE page, then thinking how to make the delivery interactive by using the right tools and methods. Contents should always be made available before any live sessions, and they should be clear and easily formatted. Also, teachers must avoid surprises in online or virtual education (this should be avoided with classical delivery as well), so don't leave announcements and decisions till the last minute.

7.2 Familiarize yourself with the available tools

Teachers must be very familiar with the tools they use with online education, and must avoid trial-and-error and guessing when using these tools. Also, they need to know the extent of the tools and their capabilities and to utilize every possible feature without complicating things for the students. Teachers must choose the right device and platform that they are confident with and use tools and software that is easily available to the students as well.

7.3 Promote student discussions and participation

Student will eventually lose interest and soon suffer from lack of enthusiasm and engagement in online or virtual teaching. Teachers must find ways to bring student back on board by promoting discussion and participation. Students could be asked to prepare short presentation (recorded or live) weekly to their peers as a way to engage everyone. For live sessions, students could be asked to join earlier than the designated session time to create a social (virtual) activity such as a quiz about music, movies or general knowledge.

7.4 Maintain regular meeting times or virtual office hours

It is always a good idea to maintain regular times for live sessions and virtual office hours rather than ad hoc or random. This will help the students (and the teachers) to prepare and plan for these sessions beforehand. Automatic reminders, notifications and agenda invitations could be used to remind the students about these sessions so they don't forget to join.

7.5 Offer incentives

It is very useful to provide tasks (formative or summative) to the students and setting corresponding deadlines rather than leaving things loose. Students should also be offered incentives (bonus marks or others) if they finish tasks earlier or with high quality. Students could be named "Student of the week" or could be asked to deliver a presentation about a topic of their choice for their peers as an incentive.

7.6 Provide material in different formats

Teaching material must be provided in different formats for the students. Some students prefer to read textual information; others prefer videos and/or multimedia to learn new topics. This should be respected and facilitated for the students.

7.7 Offer inclusive learning

When designing a course, it must tick all the boxes for inclusivity. This is important for all the students in general and for students with special needs in particular.

7.8 Ask for students and colleagues continuously

Teachers must always seek feedback from the students they teach to improve delivery and teaching experience. Students must be able to communicate their feedback after each session or lecture and about their overall experience in a course. The actions taken after collecting feedback must be circulated to the students as "you said…I did" tables, so they know that their feedback is taken seriously. Feedback from colleagues must also be collected as well and best practices must be shared amongst academics.

8. Conclusions

In this paper, examples of teaching methods based on the use of technology that are employed during the lockdown period were provided. Moreover, a number of subsequent challenges due to current situation are discussed, and recommendations for implementation and best practice are shared. Also a proposal for a flipped delivery model to move forward is provided and discussed. Anecdotal student feedback has shown that the used methods and techniques were really helpful and have boosted student learning in this difficult time.

Huge experience was gained and tremendous distance learning tools were tested and developed during the pandemic period, and these must be utilized in the upcoming years. Institutes shouldn't just restart and resume normal business after this ends but to rethink delivery and teaching methods. Moreover, flipped and inclusive learning will be the buzz words in the near future.

The shock of COVID-19 pandemic on education has never been experienced before. Vulnerable students and teachers are the most disadvantaged and affected parties, so both must be supported during these difficult times.

The proposed flipped learning delivery model in this paper will be applied in the next academic year (2020/21), and student feedback will be collected afterward, and the results will be published in a future paper. Next academic year will still be challenging but it'll dictate how the upcoming years will go on.

9. Acknowledgement

The author would like to thank the staff of the Department of Electrical Engineering and Electronics,

University of Liverpool, for supporting this work. Also, thanks are extended to the staff of the Computer Services Department (CSD) and the Centre for Innovation in Education (CIE) in the University of Liverpool for their help and encouragements.

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The University's Roles in the Historical, Social and Cultural Context, and its Importance in the Realization of Human Rights and Brazilian Democracy

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Abstract

This research exposes narratives and arguments of conceptual and historical content about the conditions and purposes of the University, particularly in Brazil, seeking to describe and reflect on central aspects of this institution. It is recognized, in advance, the importance of constitutional autonomy and secularism within these institutions. This recognition is understood as fundamental in the process of actualizing human rights in public spaces for the construction of citizenship. The problem of this text is related to the question about how much the libertarian role of the University is supported in reality in the processes of construction of republican democracy. The hypothesis is that at some point the University stopped resisting prejudices, the banality of lies and the habit of bad manners in internal relations between workers and in the institution's relationship with the community. The University, in our time, has been pressured not to bend to obscurantism, surrendering to market demands and renouncing the exercise of a critical judgment. Thus understood, the University loses consciousness of itself as an autonomous space for freedom of thought and for the development of sciences, arts and morals. Notably, when one observes the return or perpetuity of characteristic traits of neofascist movements and policies, which insist on intending the young Brazilian democracy, the urgency and challenge of rebuilding the University as a privileged locus for basic research, for the construction of advanced knowledge and for the technical application of knowledge before concrete demands is expanded. The task of students is arduous in times of authoritarianism of every order concealed by the progress idea. To carry out this research, the inductive method was used, with dialectical and historical methodological contributions, focusing on the technique of bibliographic research.

Keywords: university; human rights; neofascismo; democracy

Initial thoughts

This research seeks to identify and reflect on the roles of the University, notably the Brazilian one, in the context of contemporary society, especially before the "new" totalizing globalized scenario and the presence of neofascist policies that drink at the source of classical fascism, rebuying an authoritarian woe - always present - within Brazilian democracy.

Starting from some nonlinear, incomparable historical incursions, so to speak, to a museum visit, here is a brief genealogy of the University, from its millennial emergence to the market conceptions that surround the educational sectors, often distorting the formation of knowledge.

While the objectives of this research are committed to the requirement that the Brazilian University remain autonomous, free and secular, the research problem is focused on asking how much the liberating role of this institution has been developed in the contemporary context.

The hypothesis is that at some point the University succumbed, so to speak, in the development of these roles, as the maximum tension of democracy put the University back in one of the privileged places responsible for facing this debate, notably in the field of social sciences.

Thus, bearing in mind these horizons, the article is subdivided into four sections, namely: (i) historical notes about the University; (ii) first Brazilian universities and socio-political, cultural and economic conjunctures; (iii) tensioned democracy: in addition to flirting with fascism; and (iv) the role of the University in the contemporary context.

For these theoretical articulations to be possible, the inductive method was used, starting from specific premises to reach other forms of observation, also using dialectical and historical methodological contributions. The main technique was bibliographical research.

This work discusses these issues as a way of contributing to studies and researches related to the functions and purposes of the University in the context of Brazilian democracy and its unique role in the realization of human rights.

1 Historical notes about the University

It is understood that historical incursions should not be carried out as a "museum history" or as a mere revisit to the past, because their importance lies in experiencing the remote effects in the present and projecting results for the future, making not only historical traits, but above all, social and cultural aspects, acquire significant importance in any analysis within the social sciences that is committed to human rights[1] and democratic ideals.

It is with this purpose, not merely contemplative, that this research seeks to identify, firstly, the first contours of the University in its embryonic locus, which dates back to the "grove of scholars" of the

[1] The expression human rights was used as a way of emphasizing that this issue is not partisan, although there is often an interest in its appropriation inadvertently by political groupings.

philosopher and mathematician Plato (387 BC)[2], a sacred place on the outskirts of Athens[3], surrounded by olive trees, in which the use of an expression used and disseminated in the university circles - the academic doing - will be consecrated, signifying a privileged and select place of contemplative, reflective and constructive thinking.

Although it is difficult to accurately identify the emergence of the first Universities, it is believed that the first institutions date from the 11th and 12th centuries, especially the University of Bologna in Italy, in 1088, whose Law school was created in 1150, naturally clergy-dependent, considering that it disregarded a secular State. In this sense, Strefling's words (2012, p. 16) should be stressed:

> **Dating the emergence of the first university becomes difficult**, either for lack of documents, or for the need to define previously what university means, also because it would be necessary to make a somewhat arbitrary censorship within a process of slow evolution, in order to determine when an institution ceased to be a school to become a university. Some consider Salerno as the first, because its medical school dates from 1050. As a corporation, the first was Bologna, which had only a Law school and only in 1352 acquired a Theology school. Paris was recognized by Philip Augustus in 1200 and shortly thereafter by Innocent III. Oxford's first document dates from 1214. Padua from 1222, Naples 1224, Salamanca 1228, Montpellier 1229, Seine 1246, Coimbra 1228, Krakow 1364, Heidelberg 1385. Between 1200 and 1400, 52 universities were set up in Europe [emphasis added].

Despite this difficulty in establishing a unique milestone for the emergence of the first Universities, even referring to Bologna and Paris, it is in the political, social and cultural movements carried out in a reasonably coordinated way during the century of philosophy [4] that the University would project the beginning of its autonomous claim.

This was of fundamental importance to question, through reason, religious dogmas. In law, also at this point, the conceptions about legal dogmatic embryonically imbricated with models of a catholic dogmatic, which only in the 19th century (Andrade, 2003, p. 22) will effectively gain another frame, but not yet liberated from the dominant[5] dogmatic purism in the theoretical common sense of jurists (Streck, 2001, p. 40).

In this scenario, one cannot fail to mention the fall of the Bastille prison, which housed several

[2] In this line of ideas, Rodrigues (2006, p. 633) points out: "[...] returning to Athens, Plato founded the Academy. Good political leaders should be educated philosophically. There were classes for students and lectures offered to a large, external audience. Among the most well-known disciples of the Academy are Aristotle, Xenocrates and Espeusipo. Since its founding until Plato's death, it has been about forty years. Plato taught there using the dialectical method. Various subjects were addressed: mathematics, astronomy, harmony, politics. It is said that many students came to the Academy to find a way of life that would make them happy. However, what they actually found was many math and astronomy classes. The ultimate goal, however, would be to train political leaders."

[3] Although it is not possible to affirm the formation of the University as we know it today, we can point to the olive grove as a landmark of intellectual formation.

[4] The Enlightenment movement that influenced the French Revolution is fundamental for the University, at the end of the 18th century, to become secular.

[5] In this sense, in the social sciences, Postgraduate Programs have significantly contributed to overcoming models based on repressive knowledge.

condemned for political actions, as the culmination of the French Revolution, a time in which the famous Declaration of Human[6] and Citizen Rights was proclaimed, which now defines a series of individual and collective rights, thus giving birth to rights considered inalienable and sacred to humankind, as well as an ambitious project of general happiness interdependent with the happiness of individuals.

It is in this context that the University becomes secular, with autonomy of thought and as a source that constructs scientific knowledge and multiple types of knowledge, fundamental to oxygenate and feed a series of uniform postures that insist on circling the most diverse social, cultural and political spheres.

In Brazil, late, the phenomenon of universities appears in the 19th century, at the time of Colonial Brazil and, therefore, under strong European influence. The first forays of these institutions in Brazil will be presented in the next section.

2 First Brazilian universities and socio-political, cultural and economic conjunctures

The construction of the Brazilian University dates back to Colonial Brazil, taking into account the interests of the ruling elites and, of course, European culture, but already partly removed from ecclesiastical dogmas. Practically seven centuries "backward" in relation to Europe, the Medical and Law schools appear in Brazil as exponents of these embryonic structures, alongside Mathematics, Chemistry, History and War Engineering (Souza, 1996, p. 48).

If, on the one hand, medical courses gradually multiplied throughout Brazil, to the point of lacking doctors in peripheral states, on the other hand, Law schools expanded geometrically, to the point of exceeding the current mark of 1,000 law schools (Durigon, 2017, p. 792).

In any case, emphasizing initially the historical character, the first Federal Universities appeared in Rio de Janeiro (1920), São Paulo and Porto Alegre (1934), still considered centers of excellence in teaching, research and extension. This model originated in 1951, when the National Research Council (CNPq) and the Coordination for Higher Education Personnel Improvement (CAPES) were installed, which were fundamental for structuring Brazilian postgraduate studies.

The cutting of funds, especially for research, as will be verified throughout this investigation, is part of the new "pseudo democratic" ideals that seem to seek the elimination of critical and scientific thinking indispensable for the emancipation of subjects, the construction of citizenship and respect for human rights and its universal libertarian character.

In the first half of the 20th century, when the first federal universities aforementioned emerged, the idea was that they should be shaped by the German Humboldian model, which aimed to unite extensionist actions with teaching and research[7].

The path of consolidation of university autonomy has never been completely unimpeded. The military

[6] Even though the mother document of the French Revolution represents a milestone for the Constitution of Human Rights, it nevertheless remained unscathed in the eyes of Olympe de Gouges (female writer, activist and abolitionist) the macho and authoritarian character of the movement. The author wrote in 1791 (two years after that document) the Declaration of the Rights of Women and Citizens. She was considered a traitor and executed in 1793. Gouges' document constitutes one of the bases for the realization of universal rights.

[7] In this sense, article 207 of the Federal Constitution should be highlighted, referring to: "Universities enjoy didactic-scientific, administrative and financial and patrimonial management autonomy, and will obey the principle of inseparability between teaching, research and extension." (BRAZIL, 1988).

coup of 1964[8] triggered a wave of repression of student movements, keeping a vigil on Public Universities, which were seen as a focus of subversion - in fact, as has been reshaped by the remixed version of Brazilian authoritarianism.

From the 1970s, and advancing to the present day, when there is a certain destabilization of Public Universities[9], the private sector began to be interested in higher education, obtaining authorization for the establishment of for-profit educational Universities, and making room for foreign institutions and publicly held educational groups.

It is in this scenario that the Kroton group emerged, today the largest higher education company in the world by capitalization, and which earns huge profits. Recently, the group did not achieve the purchase of the Estácio de Sá company only because it was barred by the Administrative Council of Economic Defense (CADE) in order to avoid the formation of a monopoly in the education sector.

At least concerning the private sector, the market became the "God" of the formation of knowledge, causing the process of secularization to be replaced by economic and for-profit interests. Although in some cases these Private Universities can guarantee a good level of quality, these institutions are not always linked to the constitutional objectives of the Brazilian University, whose guidelines and responsibility aims to train ethical, critical and socially conscious citizens.

In this sense, considering that the Brazilian University has a constitutional framework – as already highlighted – there is no room for doubt regarding its engagement in the constancy of the democratic process and the Rule of Law, especially with the need to propagate and maintain the young Brazilian democracy, naturally in relation to its responsibility, especially in the moments of tension and advancement of authoritarian drives, always perennial, as will be pointed out in the next sections.

3 Tensioned democracy: in addition to flirting with fascism

Brazilian democracy, even at a young age, has suffered serious attacks on its pillars, not only by the presence of the capitalist mode of production as its privileged host, which brings a new connotation in relation to its initial ideals, but also by the presence of movements not always partisan that carry, intentionally or not, ideals of a visibly fascist nature, at least in the eyes of a more attentive observer.

At first, it was thought that some ideological movements would only be excesses of a certain political stance, but gradually it turns out that some clearly fascist structural matrices are being cleverly launched within Brazilian society, in order to erode the desire for good democratic and republican governments. Paradoxically, these authoritarian ideals are wrapped in flags of freedom, as a way to conceal nefarious objectives related to the ultra-concentration of powers, a mark of policies aimed at overcoming the constitutional frameworks established in the Democratic Rule of Law.

Although not new in Democratic States, authoritarian and undemocratic tensions and drives have taken on disproportionate dimensions. It is not new that the Brazilian State has been receiving the visit of the host of capitalism, relegating the State to social terms as minimal as possible, as the theses of economic

[8] Although today some policies intend to deny it as a strategy for expanding power, memory does not forget the presence of the coup.

[9] Government programs like Prouni and Fies do not meet the demands of higher education.

neoliberalism claim, but at the same time transforming the Penal state[10] into a maximal power (Martins, 2013, p. 12).

The Rule of Law, since the French Revolution, has suffered strong influence and distortions. Surely the contemporary Rule of Law is different, characterized by the strong influence of the economic system in the political system and, consequently, in the constitutional system.

Nowadays, it is clear that capitalism is coupled with fascist characteristics - even in the form of algorithms in social networks - with the clothing of "new and libertarian" movements. Fascism and capitalism unite, seeking to eliminate much of the criticism of contemporary socioeconomic and legal systems. At this point, Martins' words should be underlined (2013, p. 24):

> Underestimating the frequency with which expressions such as "societatis fascisms", "punitive fascisms", "fascitization of the justice system", "media fascisms" or "light fascisms" are uttered, moreover in contexts of principle-logical and axiological frankness of democonstitutional systems, **is to refuse fascism the condition of aggregator category of scattered elements and diverse functionalities,** which, by themselves, singularly considered and regardless of the aggregating reference, are claimed and activated to the taste of concrete objectives, **not to mention that the societies in motion themselves produce fascist forms** [emphasis added].

One came to think at some point in the author's argumentative exaggeration. However, as occurred in Mussolini's[11] Italy, it is not too much to point out that in Brazil this approach has actually occurred, especially from a mythological idea and the structuring of very clear contributions, some of which will be worked on in this research, starting with the discourse of Benito Mussolini, in 1922, transcribed by Stanley (2019, p.19):

> **We create our myth. Myth is a faith, a passion.** It does not have to be a reality... **Our myth is the nation, our myth is the greatness of the nation!** And to this myth, this greatness, which we want to turn into a total reality, we subordinate everything! [emphasis added].

It is notorious that many discourses of the past are intentionally mythical, as a way of eliminating any negative aspect that is related to the reactionary actions practiced by States[12] and to pave the way for authoritarianism, the concentration of power and purist and pseudo libertarian ideals.

In this "new" politics, the importance of the family is added, but not in relation to its various forms of

[10] This is not new. It is enough to check the data from the Brazilian prison system to observe the geometric progression of the number of prisoners, especially the jump that occurred since the 1990s, without decreasing the rates of violence. On the contrary, these indexes increased. Of course, punishment is a necessary means. However, it alone, with no public policy of "no access to violence", is insufficient to minimize the numerous problems arising from crime.

[11] As for Mussolini's mythological rise, it is worth underlining: "Mussolini did his part to sanctify the myth. At the last train stop before Rome that day, he considered the possibility of disembarking and entering the city on horseback, surrounded by his guards. Although the plan was abandoned, he later did everything he could to strengthen the legend of his rise to power as, in his own words, a "revolution" and an "insurrectional act" that launched a new fascist era" (ZIBLATT; LEVITSKY, 2019, p. 24).

[12] Currently, in Brazil, there is a denying trend in relation to the barbarities carried out by the Military Dictatorship.

construction and manifestation in contemporary society, resulting from the advancement and evolution of family law in the recognition of gender and equality issues, as already recognized by the Supreme Court. That is to say, non-recognition is not only due to a prejudiced issue, but also, above all, to a structural issue.

The purely patriarchal family becomes one of the central elements of the "nation", although - fatefully - many of these ultraconservatives can "go to a mass in the morning and to the brothel at night", but in no way can they recognize, for example, the equality of homoaffective unions. In this perspective, Stanley (2019, p. 22) is surgical in diagnosing these structures of fascist movements from their embryonic conceptions:

> **In a fascist society, the leader of the nation is analogous to the traditional patriarchal family father. The leader is the father of the nation, and his strength and power are the source of his legal authority,** just as the strength and power of the father of the family in patriarchy is supposed to be the source of his supreme moral authority over his children and wives. **The leader provides the nation, just as in the traditional family the father is the provider.** The authority of the patriarchal father derives from his strength, and strength is the main authoritarian value. By presenting the nation's past as a past with a patriarchal family structure, **fascist politics connects nostalgia to a central organizing hierarchical authoritarian structure**, which finds its purest representation in these norms [emphasis added].

The patriarchal family, as a central element of fascist politics in its maximal power, creates extremisms whose historical events cannot fail to be recorded so that they no longer be repeated, as Mate (2005, p. 168) points out that "[...] the past embraces the present of luck that a politics with memory has to be a mourning politics."

Some say that all citizens should visit the concentration camp museums to feel the desperate energy of the thousands of holocaust victims as a way of eliminating the possibility of repetition. Under the motto "progress and fascism" the bodies are being sweetened, at least those of those who allow themselves to be drunk by the symbols of a "better" world, directly affecting the way of doing politics. As Mate states (2005, p. 101):

> From this perspective, we said that **fascism and progress are united.** Things, on the contrary, do not remain there, because this logic ends up affecting our way of doing politics. Hannah Arendt defines totalitarianism as the tragic combination of two principles, thus far not experienced: that anything is possible and that everything is necessary. If everything is possible, everything can be experienced, even more, everything that falls within the power of man must be activated, acted [...] Totalitarianism destroys political life because it is an attack, first of all, against plurality, that is, against the fact that the species will be unique, but individuals are diverse [...] **Finally, totalitarianism denies freedom** [emphasis added].

Paradoxically, fascist politics advocates that it is necessary to potentiate libertarian ideals, when in

reality this is just a pseudo discourse that aims to advance, take, monopolize and concentrate power, whether Foucault's microphysical powers, or the macro powers of governance.

Added to this authoritarian broth is the return of a strong presence of religion, constitutionally assured, but which should not aim at the return of a wave of a non-secular State.

Not only that, the bulwarks of morality that are housed in the Brazilian State abuse the anti-corruption flag, admitting that this is done even outside the rules of the democratic game. In other words: under the icon of combat - war tactics - against corruption, even the process logic is reversed - in this case the criminal - which ceases to be an instrument of containment of state tyranny to become an instrument at the disposal of the State.

Within the ultraconservative movements, there are those who come to support the need for the return of AI-5 and the closure of recognized democratic institutions that are part of the structure of the Brazilian constitutional system.

In this context, as a way to better equip these desires, propaganda works focusing on undermining and distorting democratic institutions. With media and mythological propaganda, the real objectives are hidden and fully accepted concreteness is disseminated through an easily accessible language code, as Stanley points out (2019, p. 65):

> A central principle of fascist **politics is that the purpose of oratory should not be to convince the intellect, but to influence the will.** The anonymous author of an article in an Italian fascist magazine from 1925 writes: "The mysticism of fascism is proof of its triumph. **Reasoning does not attract, emotion does."** In Mein Kampf, in a chapter entitled "The struggle of the early days: the role of the speaker", **Hitler writes that it is a great misunderstanding to consider simple language as stupid** [emphasis added].

The intention of fascism, whether in its embryonic version or in its new version systemically connected to capitalism and large economic groups, as a perverse way of governing and denying otherness, is to escape the intellect and reach in an orchestrated way all the hearts that believe in purist ideals.

In this context, anti-corruption campaigns gain prominence, as if its repudiation were exclusive to ultraconservatives. Paradoxically, this symbolism can hide other forms of corruption, based on the aspiration for the seizure of more power[13], because fascism arising in the democratic bosom does not want to give chance for the survival of diverse thought.

That is why the political scandals of fascist regimes are minimized, while they would be enhanced within democratic policies by the very openness and dissemination of data. In a single sentence, as Stanley (2019, p. 39) points out, "[...] corruption, for the fascist politician, consists of the corruption of purity, not of the law." This is why myths gain support and feed back into political pandemics (2019, p. 41):

[13] As Bobbio (1986, p. 95) says, "[...] where the supreme power is hidden, the counter-power tends to be hidden as well. Invisible power and counter-invisible power are the two sides of the same medal. The history of any autocratic regime and the history of the situation are two parallel stories that refer to each other. Where secret power exists, there is also, almost like its natural product, anti-power equally secret or in the form of conspiracies, plots, coups d'état, plotted in the corridors of the imperial palace, or in the form of seditions, revolts or rebellions prepared in impassable and inaccessible places, far from the eyes of the palace inhabitants, just as the prince acts as far as possible from the eyes of the common."

> **Masking corruption under the guise of anti-corruption is a striking strategy of fascist propaganda** [...] The undemocratic intent behind fascist propaganda is fundamental. **Fascist states focus on dismantling the Rule of law**, with the aim of replacing it with individual government dictates or party leaders. It is standard in fascist politics that **harsh criticism of an independent judiciary** occurs in the form of accusations of bias, a type of corruption, **criticisms that are then used to replace independent judges with those who will cynically employ the law as a means of protecting the interests of the ruling party** [emphasis added].

Of course, no citizen politics, attitude or behavior should be in agreement with corruption. Nor is its "combat" the privilege of some groups, not least because it has already been identified that this discourse often serves to conceal other forms of corruption, just like illegitimate means of seizing power. The point is that the "fight against corruption" done outside the rules of the game is as corrupt as corruption itself, because it creates rules of punishment outside the democratic system.

It is not too much to recall that punishment is a legitimate and necessary act, but that it requires an ethical minimum when the justice system is called into question, especially the criminal system, which has been marked throughout its history with harmful punitive means, as Foucault demonstrates in "Watch and Punish".

This orchestration of acts and attitudes of fascist politics - in what interests this research[14] - would not be complete without the establishment of a climate of *anti-intellectualism*. It is precisely at this point that the University, not only the Brazilian one, is also tensioned in a destructive way, which is why it must give its answer, otherwise the democratic ideals succumb.

The non-partisan ideological confrontation[15], understanding the concept of ideology as the study of ideas, often occurs in an unequal and disproportionate way. This is because fascist politics does not intend to reach the intellect, but only emotion, thus acting in the plane of irrationality.

There is a kind of self-destruction of democracy, because, within its democraticity, democracy itself allows for these diverse spaces of thought, actions and manifestations. Nevertheless, there is no doubt that freedom of expression must have limits in the midst of a tensioned democracy. In this line of ideas, Stanley's thought is stressed once again (2019, p. 48):

> **Fascist politics seeks to undermine public discourse, attacking and devaluing education, specialization and language**. It is impossible to have an intelligent debate without an education that gives access to different perspectives, without respect for specialization when knowledge itself runs out and without a language rich enough to accurately describe reality. When education, specialization and linguistic distinctions are undermined, **only tribal power and identity remain**

[14] Several other points could be analyzed in the wake of Stanley's thinking. But this should be the subject of another reflection. In order to meet the thematic delimitations that we propose in this investigation, we advance to the themes of simplification of thought and distance from the intellect.

[15] As Figueiredo (2006, p. 455) states: "It would be naive to consider that Law is a mere product of ideology or an element constituted by society, in a linear relationship of cause and effect. In fact, Law is a phenomenon that constitutes these same relationships. Law, ideology, social relations and power relations are inseparable elements."

[emphasis added]

This machinery of discursive attack places dissenting thought in a kind of Marxist package, distorting Marx's own ideas, often without knowing them, and minimizing or radicalizing left-wing discourse, favoring a process of bipolarization. The idea that guides this article is that, however, there is no debate outside the antithesis and when the complexity of social and legal phenomena is ignored.

In this universe of tensions and authoritarian impulses of the most diverse orders, it is not too much to warn the State of Exception as a microcosm of the Rule of Law and as a paradigm of government, as Agamben denounces (2003, p. 9-51), challenging the University, in what concerns it, so that it also gives an answer to the decay of the civilizing level that at hard costs was built by contemporary society.

4 The role of the University in the contemporary context

The University plays a crucial role in societies: far from producing only workforce, it strives to build new knowledge, seeking the student's autonomy as a subject of law, able to understand the dynamic relations of the contemporary world. It is a complex task that also embraces, within its limits and potentialities, democratic ideals.

The careless[16] with the matrices of constitutional, ethical and political order allowed for the rise of authoritarian movements within society. Although it is essential to maintain these functions, one can no longer, naively, reduce the role of the University to its sustenance, because, it is never too much to recall, fascist policies usually arise from the democratic environment and threaten the autonomy of educational institutions.

It is necessary to go further and build coalitions in defense of democracy, without necessarily renouncing the wishes originating in the University. This does not mean joining friends (Ziblatt; Levitsky, 2019), but opponents maintaining an indispensable ethical minimum.

There is no doubt that the complexity of these roles consists of educating and maintaining memory as a paradigm for the future, respecting differences as a way to enable social, ethnic and racial inclusion, fundamental for democracy to be not always at the mercy of anti-democratic movements.

The human condition of language beings also plays a fundamental role in this process of education for citizenship as a liberating dimension potentially constructing a culture of equality, which can stimulate the training of critical and ethical citizens, building a collectivity not blindly subordinated to political parties. As Ziblatt and Levitsky (2019, p. 217) state: "No political leader alone can end democracy; no leader alone can rescue a democracy, either. Democracy is a shared enterprise. Its fate depends on all of us", including the University, which interests us so much in this research.

Language, for Gadamer (2010), should not be equated with an instrument or a tool, because, in all the knowledge of the world and ourselves, our own language, which has always surpassed us, has always

[16] Care is understood here in its ethical sense and as a relational paradigm, as referred by Junges (2006, p. 180-181): "This paradigm assumes the relational dimension of the human being as a starting point and sees Law as a system objective of defending the human person's unwavering expectations in their subject-in-relationship reality [...] The relational paradigm assumes the perspective of care, because its starting point is the responsibility and symmetry of interrelations in the construction of justice. The individualistic-libertarian paradigm is centered on the autonomy and individual rights of each one, disregarding otherness and interrelations."

taken us. A vestige of our finitude can be found, according to the philosopher, in the fact that in all our thoughts and knowledge we have always been preceded by the interpretation of the world made in language. Hence, the consciousness of the individual does not constitute a parameter to measure the language being, which is characterized by the absence of an I, by belonging to the "we" sphere, in a way that those who speak a language understood by no one else simply do not speak, precisely because speaking means speaking to someone and being understood.

What constitutes the common world, for Gadamer (2010), is what is spoken in the language, in which we live and where the great current of tradition that reaches us through literature is inserted. Language, in this sense, is what we enter when we hear it: the spoken, whose truth does not reside in it alone, but which refers widely to the unspoken. Gadamer evaluates that every utterance is motivated, that is, for everything said we could still ask: "Why do you say that?" That is why an utterance is only understandable when the unspoken is understood in the spoken. In other words, a question whose motivation is unknown cannot be answered, because only the story of the motivation of the question opens the scope from which one can search and give an answer. Thus, in both asking and answering, there is an infinite dialogue, in whose space, word and answer lie, and everything that is said is found in this space. For the philosopher, language is the center of the human being when considered in the context of human coexistence, understanding, consensus, as indispensable to human life as the air we breathe.

The fact that intellectuality is being attacked - in fact, as has already occurred in the Military Dictatorship - does not neutralize the role of the University, but rather intensifies its "mission", unless it also succumbs to an authoritarian engineering. In Stanley's words (2019, p. 48):

> **It does not mean that there is no role for universities in the fascist politics.** In fascist ideology, there is only one legitimate point of view: that of the dominant nation. Schools introduce students to the dominant culture and its mythical past. **Education, therefore, poses a serious threat to fascism or becomes a pillar of support for the mythical nation**. It is not surprising, then, that cultural protests and clashes at university campuses represent a real political battleground and receive national attention. There is a lot at stake [emphasis added].

Diagnosing neofascist policies, encouraging an ethical and debate-friendly stance, with historical loyalty, denouncing simplification and demonstrating the multiple variations of scientific knowledge, especially in the social sciences, are also tasks to be performed by the University.

After all, in the universe of educational institutions of a country of continental dimensions, there should be no room for a single thought that does not recognize minorities and cultural diversity. In this sense, the curriculum in higher education acquires fundamental importance, including its internationalization, as reported by Marcelino, Souza and Lauxen (2019, p. 171-172):

> The internationalization of the curriculum has taken on an increasingly prominent role for contributing to the **training of the subject towards the world reality, understanding his surroundings and acting as a transforming agent of society.** This concept of a transformative curriculum does not seem the simplest, but the current reality impels us towards it. In order to train a citizen with these

> characteristics, it is urgent that education, especially **universities, resume their role of training critically and culturally emancipated citizens, making them professionals politically engaged in their work and in contemporary reality, with a developed sense of their own self, their culture and prepared to interpret social reality with the intention to transform it** [emphasis added].

A strengthened curriculum allows for recognizing multiplicity, verticalizing human rights in all their dimensions and enhancing otherness as a way to maintain democratic perpetuities within the University, projecting them to the social environment. This done, the unique thought will naturally be repelled, putting it in its proper place, which is in memory and in the past.

Final thoughts

This article, within the defined excerpts, sought to rescue some historical reflections about the origin of the University, emphasizing the actions of these institutions from the Brazilian University since the public sphere to its openness to the private sector, as well as the crisis of values that plagues the various social sectors.

In this horizon, it was identified that neofascist incursions do not represent sporadic flirtations or simple excesses of language and harmless actions. From the analysis of some contributions of fascism, which seems to have taken over a fraction of the discourses enunciated in Brazil, such as the appropriation of national symbols, false moralism, the obsession with power and the attack against the gender issue as a way to maintain and strengthen the "nationalist" patriarch, elevating it to the condition of untouchable myth, it can be seen that democratic tensions really seem to have reached a limit and that authoritarian objectives have no longer been concealed, although they remain without significant blockades.

In democratic societies, freedom of the press and the free expression of thought must be ensured, but it is also of fundamental importance to respect an ethical minimum, rejecting undemocratic acts. It is notorious that, in this context, the University and opinion-forming discourses, linked to the purpose of training critical and ethical citizens committed to the ideals of freedom, have a fundamental role in contemporary society, and it is up to the University not only to defend the constitutional framework, which has proved insufficient.

In Brazilian democracy, the scourges of their constitutional bases acquire maximal power, causing democratic institutions - including the University - to create a multiple pact for democracy, otherwise they will succumb to the mythological advances that seem to have found in the degeneration of character an instrument to potentiate hatred to the detriment of respect, tolerance and difference.

In these strange times, the plurality of ideas arising from complex thinking and the dynamics of social and political relations are being challenged by single thought, precisely the point of convergence between neofascism and consumerist and totalitarian globalization.

It is necessary to build an indispensable ethical minimum that is capable of being immune to any polarized victory, enabling human beings to enjoy a peaceful and quiet social living, maintaining and enhancing their affections.

It is not necessary to say that the theoretical inflections articulated in this research are inserted in the epistemology of uncertainty, and do not have the totalitarian claim of incontestableness, being certain that they will be the object of criticism, especially for the militants of the movements of "law and order". Nevertheless, it is understood that this article could foster a qualified debate that respects divergences and does not promote worldly attacks as if we were in times of war, devoid of memory and values, especially democratic ones, which we consider non-negotiable.

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Prevalence of seropositivity for toxoplasmosis in pregnant women in the Brazilian Federal District from 2014 to 2018

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Abstract

Toxoplasma gondii is found worldwide and infects up to one third of the world population, an infection that can be fatal to the fetus during pregnancy and in immunocompromised individuals. The prevalence of infection is variable in different countries, depending on its social and economic determinants. Considering the worldwide relevance of toxoplasmosis and its devastating effects in children infected during pregnancy, this study aims to estimate the prevalence of seropositivity for toxoplasmosis in pregnant women from the Federal District of Brazil, from January 2014 to December 2018. This is a retrospective study that included a historical series of 170,678 pregnant women screened by the Pregnant Women Protection Program (PWPP). The coverage of the Program was around 70%, being considered very good, since people seek assistance in the private service or face other types of barriers to access. The global prevalence of toxoplasmosis in pregnant women was 90,566 (53.21%; 95% CI 52.97-53.44). In the time course of the sample, the prevalence of toxoplasmosis infection dropped from 81.84% in 2014 to 38.65% in 2018. The prevalence of toxoplasmosis was higher in pregnant women aged 20 to 30 years. Another important factor was that the number of pregnancies and abortions also influenced, proportionally, the prevalence. This data indicates that the number of identified cases was similar to those observed in other countries and other regions in Brazil. However, over time, it showed a significant drop that may be due to the implementation of the PWPP in the current molds, based on public policies to protect pregnant women and newborns.

Key words: Toxoplasmosis; Prevalence; Seropositivity; Pregnant women.

Introduction

The protozoan *Toxoplasma gondii* is found worldwide. Felines are the only definitive host, while other warm-blooded animals, including humans, are intermediate hosts for the parasite [1–3]. Toxoplasma infects up to a third of the world's population and the infection can be fatal to the fetus during pregnancy and in immunocompromised individuals.

The main routes of transmission to humans are ingestion of contaminated raw or undercooked meat, contaminated unpasteurized milk, food or water with oocysts from cat feces, or vertical transmission via transplacental tachyzoites [2, 5-7]. Beef and lamb are known to be the most common sources of food-related *T. gondii* infections [2]. Injuries with sharp perforations, blood transfusions and organ transplants are also possible risk factors for infection [4].

The disease is asymptomatic in most patients. However, in the congenital form, the sequelae in the fetus can be severe and irreversible. Some babies infected with the parasite in an intrauterine form can be born without complications but present changes during the first year of life, in childhood or even in adulthood. Among the clinical evidence, the following stand out: brain calcifications, chorioretinitis, blindness, delayed neuropsychomotor development, microcephaly, hydrocephalus, bulging fontanelle, meningoencephalitis, strabismus, hepatosplenomegaly, rash, petechiae, jaundice and pneumonia [8-12].

The WHO (World Health Organization) estimates that more than half of the world's population is infected, however, most individuals are asymptomatic and do not develop the disease [17]. The prevalence of infection can vary for each country, depending on its social and economic determinants [19, 24, 25]. In Brazil, the prevalence indicators for antibodies to toxoplasmosis vary widely, from 54% to 80%, with an equal distribution in both sexes, seroprevalence that increases with age and depends on different factors that influence its epidemiology. [18-20, 24, 25].

During prenatal diagnosis, serological screening can be performed, enabling the identification of patients susceptible to primary prevention. It also allows the detection of acute *T. gondii* infection and guides treatment to reduce the likelihood of fetal transmission, which is close to 40% in untreated women. The incidence of fetal infection is higher when the disease is acquired in the third trimester of pregnancy compared to the first trimester, but the severity of the involvement is greater when the maternal infection occurs in the first trimester [13-16].

The complications that occur during pregnancy present a serious public health problem in Brazil and worldwide. However, as mitigating factors, there are several support programs developed by the various spheres of health care, which aim to reduce the rate of morbidity and mortality. One of these is the Pregnant Women Protection Program (PWPP), also known as the Mommy Test or Prenatal Screening, which is carried out at the health unit where the pregnant woman is registered, with the main objectives of preventing, diagnosing and guiding on several types of illnesses during pregnancy, reducing the risk of mortality and sequelae for mothers and their babies. [21, 22].

Considering the worldwide relevance of toxoplasmosis and its devastating effects on infected children during pregnancy, this study aims to estimate the prevalence of seropositivity for toxoplasmosis in pregnant women from the Federal District of Brazil from January 2014 to December 2018.

Materials and methods

This is a retrospective study that included a historical series of 170,678 pregnant women screened by the Pregnant Women Protection Program (PWPP) in the Federal District of Brazil between years 2014 to 2018. The PWPP was created following the model of the Humanization Program Before and after Birth implemented by the Ministry of Health of Brazil.

Every woman has the right to assistance during pregnancy, prenatal care, delivery and after delivery. In this sense, the Ministry of Health prepared the pregnant woman's handbook, which aims at a humanized and non-exclusive reception, providing the basis for the pregnant woman protection program. The safety of the patient in this extended path is something crucial, since the booklet is the document of the pregnant woman, where it contains all the information about her pregnancy, guidelines and the care that must be taken along this long-winded path [23].

The Pregnant Women Protection Program (PWPP) in the Federal District of Brazil performs 12 basic exams during prenatal care, diagnosing, among others, Chagas disease / trypanosomiasis, hepatitis B, hepatitis C, HTLV, rubella, syphilis and toxoplasmosis. Screening tests are performed using dried blood drops stored on filter paper, a technique validated by Gómez and collaborators [23]. Blood samples of pregnant women were obtained via digital puncture with disposable lancets, collected on filter paper (S and S903) and dried at room temperature. In the laboratory, dried blood samples were eluted from the filter paper.

During primary infection the body produces IgM antibody against the infectious agent, but there is no production of IgM for long periods, as there is a process of changing the antibody class that changes from IgM to IgG, that is, after a three months we have a reduction in the concentration of antibody of the IgM class, until it is no longer secreted by the plasma cells or is released in a residual form for up to one year. Consequently, the antibody changes classes, with the production of the IgG antibody (which is observable during chronic infection / exposure) and this is characterized as an immunological memory tool, being produced for life (acquired immunity). The purpose of the test is to find out if there is a recent infection or if the pregnant woman has been in contact with the parasite in the past. According to the serological profile presented by the individual, the stage of the infection (acute or chronic) can be determined.

The diagnosis is based on direct and indirect methods. Commonly, the indirect method is performed in primary serological screening, being performed for both the IgG and IgM antibodies *T. gondii* using the Elisa method (immunoenzymatic assay). The exam is done at the beginning of the 1st trimester of pregnancy (IgM and IgG) [24-27].

In order to estimate the prevalence of toxoplasmosis in pregnant women, the presence of positive IgG and / or IgM was considered.

Ethical Considerations

This study is a continuation of the research “Prevalence of diseases screened in the Pregnant Women Protection Program of the State of Mato Grosso do Sul between 2004 and 2007” approved by the Research Ethics Committee of CEP / UFMS (Protocol No. 1046).

Data analysis

Initially, frequencies were calculated to identify duplications and typos. Duplicate and / or inconsistent records (0.3%) were discarded. The selected variables were: age of the pregnant woman, trimester of pregnancy at the time of the exam, number of reports of spontaneous abortions, type of delivery and number of previous pregnancies. The patients were divided into five age groups: 1 (≤ 14 years old), 2 (15-19 years old), 3 (20-29 years old), 4 (30-39 years old) and 5 (40 years old or more). The data were organized using Excel ™ spreadsheets and the descriptive measures were calculated using EpiInfo software version 6.4, EpiInfo 2000 version 3.2.2v, and ArcView GIS version 3.3. The coverage of pregnant women screened by PWPP in the total population was calculated using the expected rate for pregnant women according to Ordinance No. 650 of October 5, 2011 from the Ministry of Health of Brazil, where information was collected on the number of live births in each year plus 10%. Global prevalence (from 2014 to 2018) and per year was estimated; for that, we used data from pregnant women positive for toxoplasmosis divided by the total number of pregnant women screened multiplied by 100, both globally and per year, with a 95% confidence interval. The proportions of toxoplasmosis positivity in the variables mentioned above were also compared for positive and negative pregnant women using the gross Odds Ratio (OR) with a 95% Confidence Interval (CI).

Results

This study analyzed the prevalence of toxoplasmosis using data from the Pregnant Woman Protection Program in the Federal District from 2014 to 2018. In this period, 170,698 pregnant women were screened, and 480 (0.3%) were excluded from the data analysis due to duplicity and / or inconsistencies in the data (Figure 1). Thus, there was a coverage of 69.38% of the total pregnant women expected for the period, with 2016 being the year with the highest coverage (77.54%, 37042 patients) and the year 2017 with the lowest coverage (59.86 %, 29,348 patients) (Table 1).

Figure 1. Flowchart of the screening carried out by the Pregnant Women Protection Program (PWPP) of the Federal District of Brazil in the years 2014 to 2018.

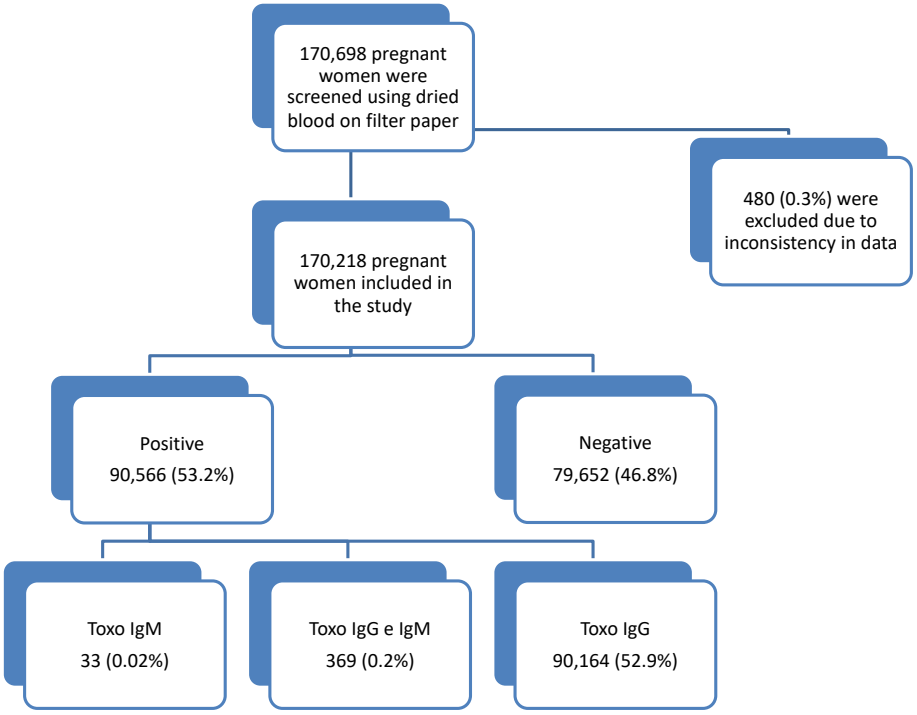
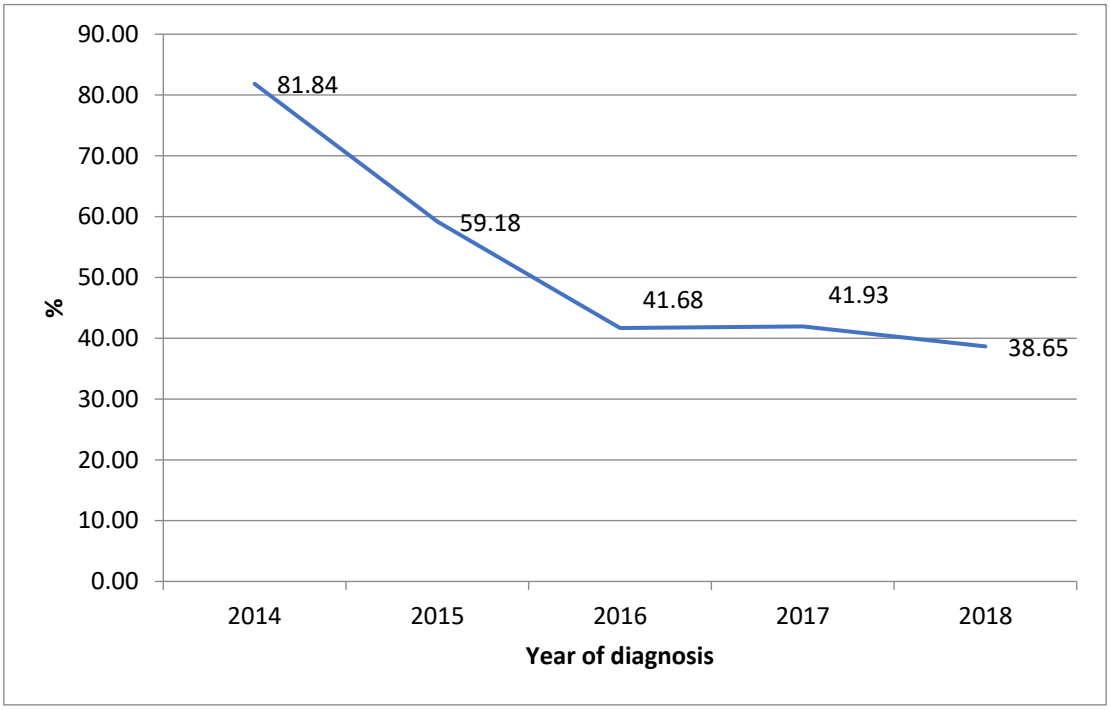


Table 1. PWPP coverage of the Federal District of Brazil in the years 2014 to 2018.

Year	Born Alive	Estimate of Pregnant Women for the Year	Pregnant women screened by PWPP	PWPP Coverage %
2014	44721	49193	35322	71,80
2015	46122	50734	36217	71,39
2016	43430	47773	37043	77,54
2017	44568	49025	29348	59,86
2018	44193	48612	32288	66,42
Total	223034	245337	170218	69,38

Of the 170,218 patients examined, 33 (0.02%) were only IgM positive for toxoplasmosis, 369 (0.2%) IgM and IgG positive, and 90,164 only IgG positive, resulting in an overall prevalence of 90,566 (53.21%; 95% CI 52.97-53.44) (Figure 1). When we analyzed the prevalence over time, there was a sharp drop over the years, starting in 2014 with 81.84% (95% CI 81.43-82.24), 2015 59.18% (95% CI 58, 67-59.68), 2016 41.68% (95% CI 41.18-42.19), 2017 41.93% (95% CI 41.37-42.50) and 2018 38.65% (95% CI 38 , 12-39,18) (Figure 2).

Figure 2. Prevalence of Toxoplasmosis in Pregnant Women Screened by the Protection Program in the Federal District of Brazil in the years 2014 to 2018.



About 81% of toxoplasmosis cases were concentrated in the 20 to 39 age group. However, when comparing positive and negative pregnant women in relation to the age group, it was observed that the greater the age, the greater the chance of the pregnant woman having a positive diagnosis for toxoplasmosis; the age group ≤ 14 years old with an OR 0.74 (95% CI 0.67-0.82) and the greater than or equal to 40 years old with an OR 1.52 (95% CI 1.44-1.61) (Table 2).

Regarding the number of previous pregnancies, it was observed that women who were in their first pregnancy had a lower chance of having a positive diagnosis for toxoplasmosis (OR 0.82; 95% CI 0.80-0.84). In contrast, those who had three or more pregnancies had an OR of 1.52 (95% CI 1.48-1.56) (Table 2).

Table 2. Characteristics of Pregnant Women Screened by the Protection Program in the Federal District of Brazil in the Years 2014 to 2018.

Characteristics		Positive		Negative		OR	CI95%
		N	%	N	%		
Age in Years	<= 14	727	0,8	860	1,1	0,74	0,67-0,82
	15 a 19	12784	14,3	15533	19,8	0,68	0,66-0,69
	20 a 29	43142	48,3	40737	52,0	0,87	0,85-0,88
	30 a 39	29337	32,9	19314	24,7	1,50	1,46-1,52
	>= 40	3263	3,7	1905	2,4	1,52	1,44-1,61
Gestation	1	36219	40,0	35702	44,8	0,82	0,80-0,84
	2	16543	18,3	13950	17,5	1,05	1,02-1,08
	>= 3	20450	22,6	12821	16,1	1,52	1,48-1,56
	Did not Inform	17354	19,2	17179	21,6	0,86	0,84-0,88

Abortions	None	46310	51,1	44540	55,9	0,82	0,81-0,84
	1	8505	9,4	6146	7,7	1,24	1,20-1,28
	2	1699	1,9	1085	1,4	1,34	1,28-1,50
	>= 3	523	0,6	344	0,4	1,34	1,20-1,53
	Did not Inform	33529	37,0	27537	34,6	1,11	1,09-1,13
Cesarean	None	50843	56,1	49173	61,7	0,79	0,78-0,81
	1	3594	4,0	2367	3,0	1,34	1,28-1,42
	>= 2	963	1,1	559	0,7	1,52	1,37-1,69
	Did not Inform	35166	38,8	27553	34,6	1,20	1,18-1,22

Pregnant women who reported never having an abortion were less likely to have a positive diagnosis for toxoplasmosis (OR 0.82; 95% CI 0.81-0.84). On the other hand, the greater the number of abortions reported by women, the greater the chance of having toxoplasmosis, reaching an OR of 1.34 (95% CI 1.20-1.53) in pregnant women who had 3 or more abortions (Table 2).

Discussion

This study detected a global prevalence of toxoplasmosis of 53.21% (95% CI 52.97-53.44) in pregnant women screened by the PWPP in the Federal District of Brazil between the years 2014 to 2018. This result is in accordance with global data and national, since the World Health Organization (WHO) estimates that more than half of the world population is infected, this prevalence being conditioned to the social and economic determinants that differentiate countries [19, 24, 25]. According to studies in Brazil, the prevalence indicators for antibodies to toxoplasmosis vary from 54% to 80% [18-25].

The prevalence of toxoplasmosis infection, studied here, decreased over the period studied: from 81.84% in 2014 to 38.65% in 2018. Considering that before 2014 there was no a such program implemented in the Federal District, it can be suggested that this decrease is influenced by the measures adopted by the PWPP, including: prevention, diagnosis and guidance on the various types of diseases still in pregnancy, thus reducing the risks of morbidity and mortality in pregnant women and their babies. [21, 22].

The coverage of the Pregnant Women Protection Program in the Federal District of Brazil was around 70% between 2014 and 2018. This coverage can be considered good since many people seek care in the private service. Furthermore, studies show barriers in assistance, such as failures, difficulties in access, late start, inadequate number of consultations and incomplete procedures, factors that directly interfere with the effectiveness of the program [28].

The prevalence of toxoplasmosis was higher in pregnant women aged 20 to 30 years. Most pregnant women in Brazil are in this age group, a factor that could explain the high prevalence in this age group. However, when the chance of having anti-*Toxoplasma gondii* antibodies is analyzed, the study shows that it is higher in pregnant women over 40 years of age (OR = 1.52 95% CI 1.44-1.61). It is known, however, that in any infectious disease, the longer one lives, the greater the chance of being exposed to the infectious agent.

Another important aspect that the study indicated was that the number of pregnancies and abortions also influenced, proportionally, the prevalence. Women in the first pregnancy had OR 0.82 (95% CI 0.80-0.84) while those who had three or more pregnancies showed OR 1.52 (148-1.56). Pregnant women who reported never having an abortion had a chance of OR 0.82 (95% CI 0.81-0.84), while pregnant women who had three or more abortions the chance was OR 1.34 (95% CI 1, 20-1.53). However, one must take into account the fact that this study is observational and uses secondary data; therefore, it has some limitations due to the absence of complementary data regarding these pregnant women, thus not allowing a more robust analysis to infer whether these variables are actually associated or not.

Conclusion

This study analyzed the prevalence of toxoplasmosis using data from the Pregnant Woman Protection Program in the Federal District from 2014 to 2018. The data revealed that the number of cases identified, in this period, was similar to what occurs in the world and other regions of Brazil. Over time, the number of cases has dropped significantly, which may have occurred due to the implementation of the protection program for pregnant women along the current lines. Therefore, this program, associated with other public policies for the protection of pregnant women and newborns, must be expanded so that this serious public health problem can be alleviated.

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Synchronous hybrid learning in times of social distancing: A report and case study on benefits, trainer's challenges, and guidelines

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Abstract

Higher education institutions (HEI) use different learning formats, such as onsite lectures or online seminars, to support their students learning. In the last decades, higher education actively supported an increase of online offerings to foster flexibility and freedom. Due to the Covid-19 pandemic learning circumstances in higher education transformed dramatically, and many HEIs were forced to shift all their courses to online learning formats. Some institutions implemented synchronous hybrid learning (SHL) as a solution between extremes that balances different needs in times of social distancing. This article outlines the benefits, trainer's challenges, and guidelines that can be ascribed to SHL under the circumstances of the current pandemic.

The results show that SHL strengthens communication and supports learning. On the one hand, SHL is an innovative, inclusive format, which supports social competencies, multiple perspectives, dynamic interactions, and immediate student-student as well as trainer-student feedback. On the other hand, SHL relies on students' equipment and depends on students as well as trainer adaption and reliable technology. Nevertheless, this report shows that SHL is a promising format, which can close one part of the digital divide between students. Future SHL endeavours should thus be carefully prepared and supported by the hosting HEI. Specifically, trainers and students should be trained on how to use the required technology, and trainers should learn about the pedagogical benefits and implementations of SHL by using protocols and chat trackers.

Introduction

White et al. suggested, in 2010, that higher education should transfer onsite learning to a synchronous hybrid learning format and wrote that in "future years, it is anticipated that universities will have inadequate physical facilities to meet the demands of an increasing student population. Additionally, with warnings of impending pandemics, universities need to be prepared to deliver courses in alternative ways to ensure continuity of instruction" (p. 34). In the beginning of 2020, this prediction came true.

In the first Covid-19 wave (February 2020 – June 2020) many European higher education institutions (HEIs) switched to distance learning or no learning sessions at all, and they now face the challenge of possible second and third waves and a rocky path back towards their usual learning sessions. Synchronous

hybrid learning (SHL), a format in which face-to-face students and online students can learn together at the same time seems to be a preferred solution for HEIs.

This article discusses SHL before and after the Covid-19 outbreak and highlights how potential and challenging this learning format is. By describing one European case of synchronous hybrid learning from July 2020, and by summarising discussions, critiques, and gaps related to synchronous hybrid learning before February 2020, this article compares in detail benefits, trainer's challenges, and guidelines in both periods, before and after the Covid-19 outbreak.

The following questions lead the discussion of the results: Is SHL an appropriate learning format considering the possibility of future Covid-19 waves? How can higher education remain a social place and a place of communication? How can SHL establish communication between trainers and students as well as between students and students? How inclusive and exclusive is SHL?

The sudden demand for synchronous hybrid learning

Europe's higher education "plays a unique role. Demand for highly skilled, socially engaged people is both increasing and changing. In the period up to 2025, half of all jobs are projected to require high-level qualifications … [w]ithout higher education institutions (HEIs) and systems that are effective in education, research and innovation … Europe cannot respond to .. challenges" (EC, COM, 2017, p. 2). Higher education strives "to develop world-class education and training" (EC, COM, 2017, p. 2).

Since February 2020 HEIs have been confronted globally with a situation never seen before. Due to the Covid-19 pandemic, many HEIs shifted learning sessions into distance mode to provide learning opportunities while socially distancing. (For different national higher education reactions see Crawford et al. 2020.) Observable indicators for this transition in the spring of 2020 are the increased demand for distance education exemplified by a drastic growth of Massive Open Online Courses (MOOCs) visitors (see the graphic below) and fast-growing stocks of online education providers (see Kindig 2020).

Synchronous and asynchronous sessions distinguish the field of distant learning. Martin et al. (2017) describe the first as "(a) permanent separation (of place) of the learner and instructor during planned learning events where (b) instruction occurred in real time such that (c) students were able to communicate with other students and the instructor through text-, audio-, and/or video-based communication of two-way media that facilitated dialogue and interaction" (p. 5). In contrast to the first is the latter form in which students determine their own learning pace and time.

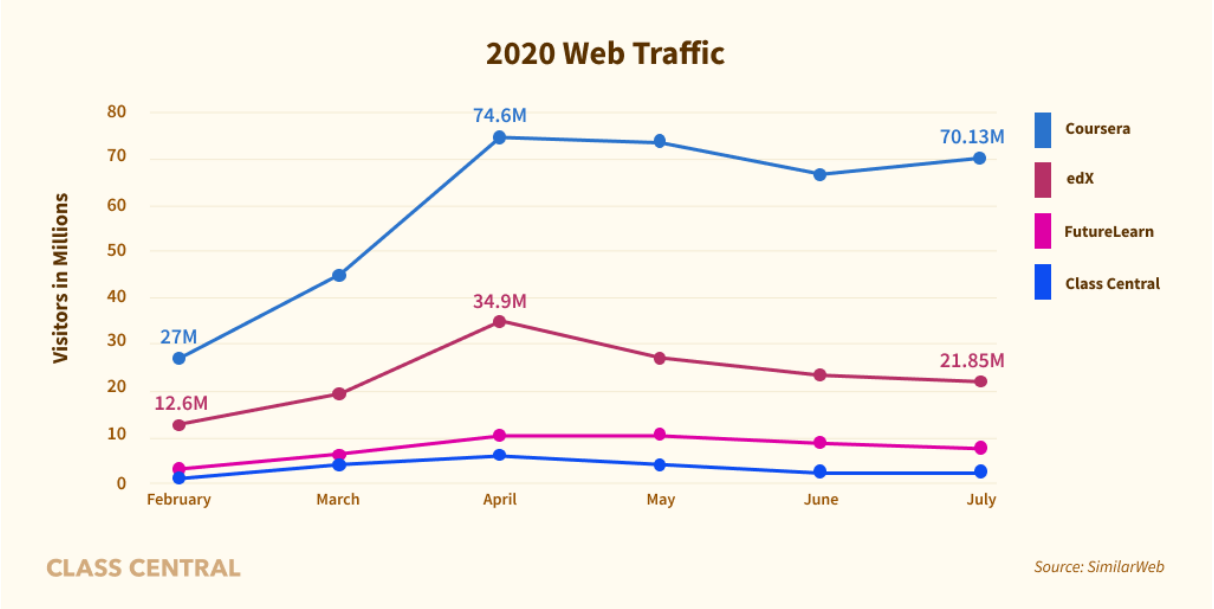

Figure 1: MOOCs visitors during the pandemic (Sha at Claas Central, 2020, https://www.classcentral.com/report/mooc-stats-pandemic/)

The sudden transition towards more distant learning sets an enormous peak on top of the steady growth of distance learning over the last decades in all parts of the world (see Palvia 2018 and Kumar 2017). In opposition to a voluntary turning towards distant learning, the global pandemic and its effects forced a lot of higher education institutions to involuntarily leave their buildings and conduct their learning sessions in the distance. That is why this massive peak in 2020 differs from former developments. Many institutions in Europe decided to transition into distance education only for eight weeks or for one semester (Crawford et al. 2020 and Hall et al. 2020). Pointing out that as soon as the pandemic would allow regular onsite learning sessions, they indicated that they would return to the usual format of teaching (Crawford et al. 2020). As time has shown, however, the pandemic expanded, and higher education institutions started to prepare for a "new normal" (Triyason 2020, Recio, S. & Colella, C. 2020) during and after the Covid-19 pandemic.

One way, HEIs adapted to this situation was to implement SHL to bring alternatives to their students and to balance stakeholders' expectations as soon as national, and respectively regional infection risks dropped. To facilitate SHL, HEIs needed different technical tools such as cameras, microphones, flatscreens, stable internet connectivity, and new software.

Many technological skilled trainers designed SHL sessions in the last 20 years (Raes et al. 2019). Nevertheless, no label was established internationally. That is why it is no surprise that the sudden demand, led stakeholders to use a diverse collection of names. Some trainers in England call it "hybrid learning", administrators in Spain refer to "liquid learning", and students in Germany call it "mixed f2f and online". Even the educational tech community uses different terms. Li et al. (2020) describe such sessions as blended synchronous learning (see table 1). Zydney et al. (2020) write of "blended synchronous learning environments", Bell et al. (2014) "synchromodal" and Beatty (2019) as well as Para and Abdelmalak (2016) call it "HyFlex".

Cyber Classroom	Physical Classroom	Simultaneous	Term
No	Yes	-	Traditional learning
Yes	No	-	Online learning/ E-learning
Yes	Yes	Yes	Blended synchronous learning
Yes	Yes	No	Blended asynchronous learning

Table 1: Distinction of the terms related to blended learning from Li et al. 2020, p. 2.

An SHL case report from Spain in times of COVID-19

In July 2020 an HEI in Spain, due to the ongoing health risk, asked trainers to teach their students in SHL sessions. This chapter outlines one case by summarising a written experience report from one trainer, who taught two sessions in the SHL format. The room was equipped with a one-directional camera and microphone, two large screens, one for presentation and one to display the remote students. The trainers were asked to bring their laptops.

The trainer (T) from this case taught two sessions with 50 enrolled students, 20 face-to-face and 30 online. Although 50 students enrolled for this course, in both sessions, only three face-to-face students appeared onsite, and 20 students logged in online. As a resume, T states: "After my first seminar in SHL format, I feel heavily overloaded."

The HEI from this case report switched to SHL, due to the Covid-19 situation in Spain. After teaching online from March 2020 until the end of June 2020, this HEI requested trainers to offer SHL as a special treat and a guess from T, (perhaps) for visa purposes. T teaches Business Ethics and usually concentrates on vivid discussions. The HEI offered T training to get used to the new technology. Nonetheless, T's students did not receive any instruction and also experienced the SHL format for the first time. "The day we had our class, I told my students at the beginning that for me it was the first time and that I needed their support and that I relied on their cooperation." Although T typically communicates her expectations and learning objectives and asks the students about their expectations, she skipped it in these SHL sessions because she did not know how to communicate with her face-to-face and remote students at the same time. She received positive feedback on the use of quizzes and polls, and said, that with this method she could connect to all students. T switched her communication strategies between the two groups. In the first session, she asked her face-to-face students' oral questions and in the other meeting her remote students. T used a chatroom and appointed a chat tracker with the task to bridge the gap between the two groups. Unfortunately, this person failed sometimes and was not always on time.

The HEI offered T a technical assistant, which she could call in case of technical failure. She says: "I felt insecure with the hardware … I was afraid that my online students could get lost. Whenever you switch from the PPT to the video, you should not forget to share the new contents. And then you have to jump back to the PPT." T usually uses flipcharts or whiteboards and missed the flexibility of being able to use them. On top of that, one onsite student "forgot her charger in one session and because of COVID-19 restrictions, I was not allowed to share my laptop with her."

As her primary challenge, T describes the lack of eye contact with the remote students. “In the first session, I was speaking to the onsite students, because the online students were on the screen behind me. The next day I went much closer to the camera, and I had my laptop next to me; so I spoke into the camera, and when somebody answered I could see them in my laptop.”

SHL Guidelines, Opportunities and Trainer’s Challenges in times of COVID-19

Why use SHL? A systematic review from Raes et al. (2019) outlines different benefits of why higher education institutions started SHL before the pandemic. Next to the wish to increase recruitment rates and to eliminate the need to teach the same course twice, SHL was implemented to increase freedom and flexibility, to include outside expertise, and to offer more elective or specific courses. HEIs can use SHL to give access to education regardless of place, to provide equal learning opportunities, to strengthen social relations between all students, and to guarantee continuity of instruction (Raes et al. 2019). In opposition to that, the Covid-19 case on hand says that their institution offered SHL as a special treat and (maybe) to counteract students’ current travel and visa restrictions. These arguments stress that the innovative, attractive, and location-independent factors of this learning setting led to its use in July 2020.

Martin and Parker (2014) summarise benefits of the more general field “synchronous online learning” in comparison to asynchronous online learning. They say it is more effective in enhancing social competencies, encourages the exchange of multiple perspectives, enhances dynamic interactions among participants, strengthens social presence, fosters the exchange of emotional supports, provides immediate feedback, supplies verbal elements, and raises student satisfaction (p. 193). (See also Chen et al. 2005 and Weiler 2012).

A closer look at the report on hand reveals SHL as a possibility for communication in which learning can be engaged. The report does not explicitly state pedagogical purposes, why SHL was used and does not refer to social competencies or multiple perspectives but names innovation as the driving force. This finding is in line with the fact that the management level of the HEI – and not trainers themselves – requested the use of SHL. Moreover taking into account that SHL equipment such as 360° conferencing cameras, omnidirectional microphones, speakerphones and so on, are currently purchased also in many enterprises, the movement towards SHL in higher education seems to be a part of a general tendency towards an innovative way to guarantee synchronous communication in times of social distancing.

Li et al. (2020) report previous challenges in SHL sessions “such as poor engagement and support, leading to low learning efficiency” (p. 2), and the systematic review from Raes et al. (2019) lists, e.g. more coordination, additional operations with the technical platform, and technical challenges with audio and video components as trainer challenges. The report, on the other hand, describes overtaxing as a primary trainer challenge and emphasises technical related communication problems, low trainer-student and student-student interaction, and the absence of eye contact.

Following the guidelines from Raes et al. (2019), the trainer from the case activated students with quizzes and poles. Furthermore, she appointed one student as chat tracker, as Raes et al. (2019) and Zydney (2019) suggested. Unfortunately, the chat tracker failed sometimes and was not always on time. So, although the

chatroom was up and running, remote students had trouble interacting on time. On top of that, conducting the polls and quizzes was difficult with the installed technology and took a long time.

The case report underpins previous findings on technical problems in SHL sessions and documents, specifically technical-based communication problems. White et al. already reported in 2010 "specified technology problems with hearing the instructor's live lecture, watching the video clips, problems with .. hardware (e.g., computer freezing, slow time to update software), or feeling removed from regular classroom discussion and activities due to the discontinuation of the live questions and comments" (p. 38). Weitze et al. (2013), Bower et al. (2015) and Cunningham (2014) etc. also reported these technical problems, and Zydney et al. (2019) prioritised them beginning with audio issues, network issues, and lag times.

SHL is a technical based learning session. The report shows that participation in these sessions is based on both the HEIs' and the students' equipment. The example of one student missing their charger exemplifies that even onsite students need appropriate material.

Discussion

The sudden demand for SHL is a reaction to the different learning conditions before and after February 2020 in higher education. In the times of recent crises, SHL seems to be one solution to restore the disadvantage between students with and without internet access and functional connectivity (UNESCO 2020), while keeping campus as the primary place of learning and identification. SHL facilitates inclusion by allowing students to decide between on-campus or off-campus learning sessions and enables the management level of HEIs to adapt to governmental and administrative directions concerning social distancing.

In practice, SHL requires its remote students to have both appropriate hard- and software and points a finger at the so-called digital divide between students (Gonzales et al. 2020 and can Dijk 2008). Depending on what equipment the HEI provides, remote students, and sometimes even the face-to-face students, need assistance to secure appropriate hard- and software (see the example form the case report above). SHL seems to be inclusive at first sight. Nevertheless, participants need to be well equipped for a session to run smoothly and without technical challenges. Although SHL enables – in contrast to online learning - the inclusion of students without internet access or functional connectivity at home by providing the opportunity of a face-to-face session for some students, this learning format is still based on the individual use of hard- and software, which van Deursen and van Dijk prove again to be unequally distributed in 2019. By prioritising SHL, HEIs can take a step towards balancing the "physical access" divide of their students but have to keep in mind that at the same time they are building upon the unequally distributed "material access" of their students.

The report on hand outlines that to teach an SHL session is a challenging endeavour, especially when trainers are not voluntarily choosing this format but are required to use it. Although T learned how to use the technology, she did not receive any training in pedagogical adaptions. Her overall tone in the report draws a challenging picture.

The advantages of SHL to bridge the gap between fostering excellent learning and adapting to different stages of infection risks can be used when appropriate technology is at hand. The comparison between both periods, before and after the Covid-19 outbreak, shows that decisions upon using SHL consider both, guaranteeing communication and pedagogical purposes. Whereas securing communication is taken into account, the report indicates that in times of social distancing, pedagogical purposes can be overlooked. To concentrate on social competencies, to use the exchange of multiple perspectives, to foster dynamic interactions among all students, to provide immediate student-student and trainer-student feedback, are primary benefits of SHL while enabling a campus/group identification. Specific methods, such as chat trackers and communication protocols (see Zydney et al. 2020) should be used to promote these benefits. When reliable technology is at hand, and trainers, as well as students, learn before the session how to use the technology and how to communicate properly between the different groups, SHL can be a format with many advantages in times of social distancing.

Ethics

All applicable international, national, and institutional guidelines for social science were followed. All procedures performed in this case study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Informed consent was obtained from the participant involved in the case study. The author declares that she has no conflicts of interest. A protocol of the case is available at Julia.priess-buchheit@hs-coburg.de.
Declarations of interest: none.

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Process of Appropriating Mathematical Concepts Mediated by Teaching Activity

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ABSTRACT

Given the importance of Teaching Orientation Activity (AOE) as an articulated set of teachers' intentionality with the possibility of promoting mathematical theoretical-scientific thinking, the purpose of this study is to analyze the process of appropriation of mathematical concepts of teaching elementar school teachers, inserted in a project of continuous formation in the perspective of Historical-Cultural Theory / Activity Theory. Regarding the process of apprehension of the investigated phenomenon, the historical logical movement of the concepts was based, based on the assumptions of Historical and Dialectical Materialism, advocated by Karl Marx. The evidence was being evidenced, especially through the preparation and development of AOE by teachers participating in continuing education, which allowed us to go beyond the appearance and fossilization of the process of appropriation of concepts, apprehending the historical mediations that comprised the phenomenon under investigation . On the techniques of data production, field observations, video recordings of the formative meetings and reflective session were worked on. It was adopted as an analytical procedure, the method of deployment in units of analysis proposed by Vigotski and complemented by the idea of "episodes" of learning (MOURA, 2004). It was observed that the teachers during the experience with the AOE, in a dialectical movement, little by little, were identifying different elements of the problem situations, commonly worked in the classroom, subsidized by formal logic. Thus, they acquire a level of awareness in the sense that as teachers, the need must be created, as well as the objective and subjective reasons and conditions for students to enter into learning activity.

Palavras-chave: Appropriation of Mathematical Concepts. Teaching Guidance Activity. Elementary school teachers.

Introduction

The present study proposes to analyze the process of appropriation of mathematical concepts of teachers of Elementary School, inserted in a project of continuous formation in the perspective of Historical-Cultural Theory / Activity Theory, which has as major exponents, the Russian theorists Vigotski and Leontiev.

We start from the assumption that empirical mathematical thinking, with a low level of abstraction, based basically on observation and perception, prioritizing the external and common properties of the concept, elaborated in everyday actions and experiences, for not providing students with training courses initial and / or continued teachers' mental actions through the solution of problems that can develop mathematical theoretical-scientific thinking, end up ignoring the peculiarities and regularities of the process of appropriation of mathematical concepts. In this regard, Sforni (s.d, p. 136) explains that

> [...] seems to be supported by an easily observable hiatus, between the initial grades of elementary school and the sequence of schooling. While representation is prioritized in the first years of elementary school, in a transit between perception and synthesis itself, in adolescence it is considered that the student already has the capacity for generalizations. That is, it has the ability to deal with attributes that are not perceived by direct observation, the result of deductions, based on nexus and interlacing, and with the internal qualities of objects, using the deductive method.

We can infer from Sforni's reflections that teacher educators must pay attention to the need to work from the perspective of the concept appropriation process, as it is still quite absent from classrooms, which exhorts us to understand that one of the most important problems concerning mathematical learning is in teacher training courses.

It should be added that, for Ferreira (2009), teacher training courses do not seek to familiarize undergraduate students with the logical, psychological, historical and pedagogical foundations related to this process, which puts us in front of the paradox: it is the teacher's competence to propose the situations that lead students to conceptual elaboration, and, however, he is unaware of the peculiarities and regularities of this process, as well as the pedagogical procedures to be mobilized to carry them out.

In line with the reflections of Sforni and Ferreira, D`Ambrósio (1993, p. 35) clarifies that the view of Mathematics that prevails in school curricula reflects the perception of what society thinks of what this discipline is, seen and characterized by "[...] precise results and infallible procedures, whose fundamental elements are arithmetic operations, algebraic procedures and definition and geometric theorems".

Despite this problem, this was the meaning we had produced about mathematical concepts coming from academia, due to the absence of a "clear perception" (VIGOTSKI, 2004) of the relations of these concepts. As evidenced by Ferreira (2009), this is a question that remains emblematic in the teaching of Mathematics, as they ignore all the variables that allow, whether the student or the teacher, to know the genesis and nature of the concepts, limiting teaching in the perspective of empirical thinking.

The reflections hitherto made us want to find answers to the question that guided this research: What do the actions made possible by the continuing education of teachers reveal, in the perspective of the Historical-Cultural Theory / Activity Theory, above all, in the development of AOE, about the appropriation of mathematical concepts?

That said, in addition to the introduction, the text was structured with sections for theoretical reflections on AOE as a theoretical-methodological principle, for the explanation of the process of apprehending the

investigated phenomenon, for the analysis and discussion of the results on training actions mediated by the process of reflection on the AOE and the final considerations.

The AOE as an articulated set of the intention of Mathematics teachers

Leontiev (1977), when conducting a research whose objective was to investigate the principles of mental development and the problem of mental retardation in children who were not able to appropriately appropriate mathematical concepts, in a pre-established time and under conditions considered "normal", observing them, in the object manipulation activity and in the establishment of relations with numerals, from a methodological point of view, brings us significant contributions. This theorist (1977, p. 115) found that:

> The teaching of arithmetic should therefore not start with generalization, but with active training in the child of actions with external objects and, in parallel, with their movement and inventory. Subsequently, these external actions become language (count out loud), shorten and finally acquire the character of internal actions (mentally count), which are automated in the form of simple associative acts. However, behind them, complete actions on objects are now hidden, actions previously organized by us. That is why these actions can always be manifested externally again.

The author therefore expresses his concern with the organization of mathematics teaching. Given this concern, and in line with this author, Moura (2010), adds by saying, so that the teacher becomes aware of the need to organize teaching in a way that can fulfill the school's primary role, that is, to enable students to students development of mathematical theoretical-scientific thinking, it is their responsibility, a priori, to make a self-assessment of their pedagogical activity. For this, it should reflect, for example, on the activities that involve the manipulation of materials as presented, often without the understanding of the teacher and, consequently, of the students, that the concepts, whether mathematical or not , are alive, fruits of human activity in movement.

On this issue, delimiting the national and local scenario, the school has found it difficult to socialize mathematical knowledge. When analyzing these issues regarding the organization of teaching in Mathematics, more specifically those concerning the teaching and learning process and teacher training, the activities proposed by the teacher must be problematized in order to provide students with triggering learning situations, which may lead to them to the development of theoretical-scientific thinking and, consequently, to the appropriation of mathematical concepts (MOURA, 1996, 2001; MOURA, 2010).

From the perspective of the Historical-Cultural Theory / Activity Theory, we understand activities that trigger learning to those activities that, in their structure, include, among other variables: the genesis of the concept / essence; the explanation of the needs that moved humanity to appropriate this concept; the appearance of problems; human needs in a given activity and the way men developed solutions or syntheses in their logical-historical movement (MOURA, 2010).

After making these considerations, we emphasize that Moura (1996, 2001), in the search for a didactic-methodological proposal, along the lines explained above, supported by the precepts of the Historical-Cultural Theory / Activity Theory and in the perspective of the logical-historical, aimed and appropriated AOE, understood as "[...] the articulated set of the educator's intentionality that will use instruments and strategies that will allow him to get closer between subjects and the object of knowledge" (MOURA, 1996, p. 19).

The AOE, in the development of this investigation, previously understood only as a unit between teaching and learning, also came to be seen as a unit between teaching, learning and research and, therefore, becoming a theoretical-methodological model that the researcher develops in the research course - the Research Guiding Activity (AOP) -, maintaining the same activity structure proposed by Leontiev (ARAÚJO, 2013), as already commented.

But what is AOE anyway? And what is your central objective? In response to this question, Moura (1996) tells us that it is all teaching activity that is structured in a way to provide the subjects involved in the activity, mediated by content, negotiating meanings and presenting a triggering situation, elaborated, for example, through a "virtual history of the concept" or games, involving the logic and history of the concept, from questions that guide the essence of the concept. In this sense, it is worth reinforcing that AOE has as its central objective "[...] to promote conceptual learning" (MOURA; SFORNI; ARAÚJO, 2011, p. 40), based on planned actions, "appropriate to the age to teach concepts theoretical "(KOZULIN, nd).

In the theoretical and methodological perspective of AOE, virtual stories of the concept "are problem situations posed by characters from children's stories, legends or from the history of mathematics as triggers of the child's thinking in order to involve him in the production of the solution of the problem which is part of the context of the story. " (MOURA, 1996, p. 20).

Given the importance of AOE as an articulated set of the intention of Mathematics teachers with the possibility of promoting mathematical theoretical-scientific thinking, the first step to be developed by these teachers is to carry out a study of the history and needs that led humanity to create the concept to be worked with the students, aiming to reach the genesis of this concept. This step is substantial to ensure greater efficiency in forwarding actions and subsequent steps, namely, the triggering situation of learning and collective synthesis (POZEBON; HUNDERTMARCK; FRAGA, 2012).

In a nutshell, the triggering situation of learning "constitutes the objectification of the teaching activity, which contemplates the elaboration, the collective solution and the genesis of the concept" (MORAES, 2008), thus bringing the triggering problem that, in the most of the time, it is presented, taking as a starting point a virtual story. From this perspective, in this stage, materials and games, for example, can be used as complementary didactic instruments.

Finally, the stage of collective synthesis, understood as the moment when, necessarily,

> [...] the class should arrive at an answer that is common to all and "mathematically correct" to the problem. This answer must be related and coincide with the historical construction of the concept, so it will be mathematically certain. The educator's action becomes essential in this moment of sharing actions and ideas,

> where everyone must reach a solution similar to the experience by man over time (POZEBON; HUNDERTMARCK; FRAGA, 2012, p. 5).

We could, therefore, synthesize that given the potential of AOE as a theoretical-methodological and research instrument, it is an instrument that, necessarily, must be part of the organization of teaching, as well as research, since it presents itself as a possibility of lead the student to reflect, to inquire, to raise hypotheses and to seek solutions to the triggering problems presented, without excessive dependence on the teacher.

On the process of apprehending the investigated phenomenon

Regarding the process of apprehending the phenomenon investigated in this study - mathematical learning mediated by the teaching guiding activity -, we show that the study in reference was anchored on the assumptions of Historical and Dialectical Materialism, advocated by Karl Marx.

Historical and Dialectical Materialism is based on the principles of dialectical logic guided by Hegel and proves to be an effective methodological instrument for understanding the real, as it is the very expression of the relationship between the laws of thought and the laws of objective reality, which gives it a status of method in permanent construction, in the same way as its object of study.

According to the precepts of this method, man is seen as a concrete, historical and singular being, which is constituted in the relationship with his reality, in the dynamics of the relations between objective and subjective conditions, which are revealed in the historical movement of social life in a way dynamic, created by men collectively and, at the same time, creator of these men. In other words, in this perspective, the world is a material reality to which man is present and can know and transform it.

In keeping with the assumptions of the method in evidence, we signal that the complexity that the mathematical concept encompasses requires that the issue of its historicity be placed in its correlation with the logical, understood as "[...] the element of mediation that allows thought theoretically recreate the history, constituting a means for its knowledge, and logic is the way this mediation takes place "(FERREIRA, 2007 apud FERREIRA, 2009, p. 56). In this view, we start from the assumption that as one of the categories of knowledge, the concept appears, develops and transforms. Therefore, discussing about the historical development of the mathematical concept was a substantial condition. There is no way to get to the essence of the concept without examining its formation and development process (KOPNIN, 1978).

It is worth pointing out that, thus, we look for signs of appropriation of the mathematical concept in order to apprehend, explain this process, based on the historical logical movement of the concepts. These evidences were being evidenced, mainly through the elaboration and development of AOE by the teachers participating in the continuing education, in the perspective of the Historical-Cultural Theory / Activity Theory, which allowed us to go beyond the appearance and the fossilization of the process of appropriation of concepts, apprehending the historical mediations that comprised the phenomenon under investigation. In addition to AOE as a data production technique, the following techniques were used: field observations and video recordings of the formative meetings and the reflective session. We also clarify that for the realization of the empirical study, we chose to delimit a sample that met the prerequisites: being a teacher

and / or coordinating teacher of Basic Education (Elementary Education) and being available to participate in the investigation, making a total of 10 (ten) participants. Thus, in order to guarantee anonymity, we use codenames: Teacher T1, T2, T3, T4, T5, T6, T7, T8, T9 and T10.

In addition, we have adopted the method of split into units of analysis as an analytical procedure. For Kosik (2011), the act of knowledge is a process of decomposition / separation of the parts of the elements that make up the whole, reality (the phenomenon investigated). Furthermore, "[...] the 'concept' and the 'abstraction', in a dialectical conception, have the meaning of a method that decomposes the whole in order to be able to reproduce the structure of the thing spiritually, and, therefore, to understand the thing". (KOSIK, 2011, p. 18, emphasis added).

Despite the words of this theorist, conceptual knowledge is the only mechanism through which we can know reality in its concreteness, in its concrete totality, since reality is not a combination of things that happen, but, rather, things that happen. are interconnected and that constitute the analyzed reality.

That said, the analysis of the process of appropriation of mathematical concepts by teachers participating in continuing education was complemented by the idea of "episodes" of learning. The definition of an episode was proposed by Moura (2004) because he understands that it is a set of actions that triggers the process of seeking the answer to the problem in question. Moretti and Moura (2011, p. 437), supported by Moura (2004), complement this understanding, clarifying that the process of clipping and analyzing episodes reveals actions "[...] in the process of training the participating subjects".

When gathering this information, Moura (2004, 2013) defines episodes as those reports that aim to narrate moments in which it becomes visible the awareness of a fact that restructures the thought of the investigated subject in the face of the question posed and that gives a new quality to the solution you work out.

In this way, we come to understand the episodes as moments of interaction in the formative encounters made possible by continuing education, in which mathematical concepts moved, producing meanings for the subjects, from the development of the training actions proposed by the mentioned project. In the case of this investigation, the episodes are the conversations and actions that reveal interdependence between the elements of the training actions. For corroborating the ideas of Moura (2004), we clarify that, when working on the logic of the episodes in this study, these were not defined based on a set of linear actions, which occurred in consecutive months or even years. Thus, in the excerpts of the conversations of the subjects of this research, present in one unit, episodes appear at different times.

Training actions mediated by the process of reflection on AOE

Given its potential, as previously discussed, it was possible to verify that the AOE enabled the teachers participating in the continuing education to reflect and become aware of the training actions, unlike the didactic-pedagogical orientations imbued with formal logic, in which the teacher prioritizes tasks (lists of exercises, dictations of loose words, homework and repetitive math problems, etc.) and teaching teaching resources concerned only with fulfilling the curriculum, often in an unplanned, unintended manner. In our understanding, formative action is any and all conscious action, that which, as Leontiev (1978, p. 303)

explains, “[...] is formed, therefore, within a sphere of relations already constituted, within such or such an activity that determines psychological particularities. ".

In this way, training actions are capable of causing qualitative changes in teaching activity. In the words of Moura (2001, p. 51), these qualitative changes "[...] can be added to or merged with those already acquired by teachers". Furthermore, it is the formal actions that lead the teacher to develop his conscience for the appropriation of theoretical and scientific knowledge as an object of pedagogical activity. From this perspective, the teacher's performance is charged with intentionality, since he aims in his activity the reason that drives him (RIGON, ASBAHR, MORETTI, 2010).

Thus, we infer that this may negatively affect the movement of appropriation of mathematical concepts and, of course, the development of theoretical and scientific thinking. Hence the need to organize teaching in a humanizing, against hegemonic perspective. We are referring to the perspective embraced in this study that conceives knowledge as a product of human activity in its multiple dimensions and, as a result, embodies the socio-historical process of its production (RIGON; ASBHAR; MORETTI, 2010).

In view of this reflection and observation, it is also enlightening in this context that this made us understand the central objective of AOE: the promotion of the learning of mathematical concepts, in a movement similar to that of its original production dynamics - the historical logic of the concept, as remembered by Moura, Sforni and Araújo (2011). In this perspective, it justifies the fact that it is one of the training actions that most enabled us to evidence the appropriation of the concept of measure by teachers in the learning space created by continuing education, during the collective development of teaching activities.

Thus, for a better explanation of the analysis and discussion of the data produced about the organization of the teaching of Mathematics in continuing education on screen, through the formative actions mediated by the process of reflection on the AOE, we chose to divide the unit of analysis on screen into three episodes: Episode 1 - qualitative leap in the teaching of Mathematics: teachers' meanings about the triggering situations of learning; Episode 2 - teachers' reflections revealing evidence of the appropriation of the concept of measure; Episode 3 - synthesis of the overcoming made possible by the continuing education of mathematics teachers.

Episode 1 - Qualitative leap in the teaching of Mathematics: teachers' meanings about the triggering situations of learning

We recognize and defend that, in the scenario of pedagogical activity, situations that trigger learning are proposed and developed as part of the AOE. Soaked by the assumptions of the Historical-Cultural Theory / Activity Theory, we observe that from the experience in the learning space created by the continuing education about this problematization format, culture appears as something to be appropriated by the subjects in learning activity and, as a result in addition, they internalize "[...] a set of knowledge that allows them to be among the subjects and exchange meanings with them, to be able to share knowledge so that together they can build new and better ways of living." (MOURA, 2007, p. 41).

In this perspective, we understand that the proposition of situations that trigger learning, according to the theoretical-methodological perspective assumed in this investigation, aims to make the subjects in teaching learning activity aware of the need for the mathematical concept to be taught (MORETTI, 2007).

That is why the problem situations are presented to the teacher and students as enabling the organization of teaching, unlike problem solving, "[...] in the sense of exercise or application to ensure the apprehension of a certain mathematical content. " (RIBEIRO, 2011, p. 137). First, because the triggering situations of learning are applied and developed in the collective and they need the appropriation of concepts, as a social objective, either to the subject in learning activity, or to the subject in teaching activity. Second, because so understood, AOE becomes the theoretical-methodological principle seen as a training unit, whether for the teacher or for the students (MOURA, 1996, 2001, 2004, 2010; MOURA, SFORNI, ARAÚJO, 2011).

In this way, the analysis of the teachers' conversations, selected for this episode in the light of the reflections of the teachers participating in this study, show quite striking evidence of the transformation of the teaching organization to a new quality, by developing new meanings to problem situations, motivated by training continued from the perspective of Historical-Cultural Theory / Activity Theory.

As an illustrative example, we have the speech of Teacher T6, stating that, "[...] it was and is being a very important job in the case of 1st year children and when it comes to when we make the comparison as that the books present us as a model of how things work for us to follow [...] a work like that, which is much more meaningful and the student learns a lot. The teacher learns a lot more "(Videography / Formative Meeting). When criticizing the format of problem situations proposed in textbooks, devoid of meanings and senses for the student, this teacher becomes aware of the limits and possibilities of these problem situations. In fact, his speech provides foresight of the transformation of the teaching organization to a new quality in the context of its pedagogical activity.

When we focus on the learning movement of mathematical concepts in the scenario of continuing education, strictly speaking, Teacher T10's reflections meet the meanings developed by Teacher T6, complementing that, in the course of problem solving, the stages of formation must be highlighted concept and interdependence with its conceptual nexus. It is what emerges from the speech of this teacher: "[...] they reveal to us the stages of construction of the concept. [...] this is knowledge [...] Then suddenly we discover the nexuses. No the child is only required to give a mathematical name, a mathematical drawing but, mainly, we also discover that there are these stages in the construction [...] "Video recording / Formative Meeting). The reflections of the present teachers are in line with Moretti's ideas (2007, p. 103, emphasis added) about this discussion. For this author, the problem situation, in the sense advocated in this study,

> [...] it is not understood as an "application exercise" of concepts previously presented by the teacher. The problem-situation [...] presupposes a first approximation of the student with the concept involved in the proposed situation in such a way that, constituting the proposed situation as a problem for the learning subject, it is possible for him to appropriate the construction history of human thought.

Moretti is totally in tune with Leontiev's precepts when he explains that the problem-situation must be thought out, constituted in such a way as to enable the subject to the historical appropriation of human thought, that is, of scientific concepts. Under these conditions, this problem situation should have the status of "learning activity", so that, as Moura (1996) complements, it becomes a tool with potential for the

development of meanings and senses about the mathematical concepts worked, demanding, therefore, for the teacher and the student, the acquisition of skills that allow them to appropriate these concepts and, certainly, the teaching organization.

It is worth emphasizing, therefore, that among these skills, according to the analysis of Teacher T8's speech, based on his experience regarding the operationalization of training actions in the learning environment provided by continuing education, mediated by collective discussions, the game is presents as an enabler of the appropriation of mathematical concepts. In order to verify this result, we record the fragments of this teacher's speech: "[...] the game puts the child in front of a problem situation, the challenging game, in contrast to the extensive standard exercise lists in schools, provides children with possibility to know, act and modify the object of knowledge "[...] (Videography / Formative Meeting).

It is worth mentioning that, in the analytical process of the fragments of Teacher T8's speech, there is evidence that there has been a transformation of the teaching organization to a new quality about the teacher's understanding of the dynamics of problem solving involving the game. The awareness of this teacher that the game presents itself as a possibility of "knowing, acting and modifying the object of knowledge" can be exemplified as a major factor in the development of his mathematical theoretical-scientific thinking. Why do we say that? Because, certainly, for this teacher, the game as a methodological resource present in the triggering situation of learning, with objectives and intentionality, contributes to the organization of teaching, its transformation in the pedagogical activity and, of course, in the development of the mathematical theoretical-scientific thinking of the students. and teachers.

Given the importance of the game in the mathematics learning process, we understand that it is in the act of playing that where one can observe the movement of the appropriation of concepts. Liublinskaia (1973, p. 44) shares this understanding with us, stating that "[...] through action, language and feelings the child reflects reality. With its development, the relationships between the main processes of knowledge, your place and role in the game. "

In addition to these findings, the analysis of this episode also showed us the awareness of the training actions by the teachers, as understood in this study, which, in our opinion, contributed satisfactorily for them to enter into learning activity.

For example, Teacher T4 when socializing his experience about the "triggering situation of learning - length", elaborated by one of the subgroups of continuing education, under our supervision and guidance, in the dazzling of his reports it is possible to notice the awareness the formative action (or directed action) on the part of this teacher and collective, namely: [...] and in that very simple activity, we asked ourselves: 'My God, how is it? I've done it so many times and I didn't realize it (activity of measuring children's height with string) ... how did the children think about it? ' It was very remarkable for me, watching the children doing the activities. When we studied the measurement part, it was very striking for me, the children realized that their height is an attribute and can be extracted and represented on a string, it is not simple. That for me was quite an impact. If you don't look at the activity, you don't hear what the kids are saying, you don't notice these things. In early childhood education, their body is their measure, there is no separate measure (laughs) "(Reflective Session).

As we can see, Teacher T4, in addition to questioning and criticizing his pedagogical activity more closely before continuing education in focus, also produces meanings about his concrete students, as so

well explained in the report: "it was very striking for me, looking at children doing When we studied the measurement part, it was very striking for me, the children realized that their height is an attribute and can be extracted and represented on a string, it is not simple. That for me was a very big impact. does not look at the activity, does not listen to what the children are saying, does not perceive these things. ”On the process evidenced in the analysis of Teacher T4's speech, with the purpose of presenting further clarifications, Sforni (2004, p. 132) brings us arguments that theoretically clarify this problem:

> Action awareness is what allows the subject to dominate and move the activity. Domain because action, when conscious, moves to the level of conscious operations, allowing it to be automated and at the same time controlled by the subject. Mobility for being requested or modified according to the operational composition of a new action according to the conditions of its realization.

Thus, we can synthesize that the reflection process of becoming aware of the action (or directed / formative action) presents itself as one of the components of the functional structure of the activity with great potential for the development of consciousness and, consequently, of theoretical-scientific thinking mathematician (DAVIDOV, 1988a, 1988b).

Despite this synthesis, we affirm that the meanings produced, not only by Teacher T4, but by the other teacher participating in this study on the problem situation involving the concept of measurement, present themselves as revealing what Sforni (2004, p. 133) characterizes as the "[...] moment of 'taking possession' of the action itself, a fundamental and differentiating moment of learning scientific concepts in relation to the learning of spontaneous concepts.", positively affecting the transformation of the teaching organization in Mathematics to qualitative leap.

Episode 2 - Teachers' reflections revealing evidence of the appropriation of the concept of measure

In this episode, in particular, we have the purpose of identifying evidence of the appropriation of the concept of measure by the teachers, subjects of this research. To achieve this purpose, we consider the different relationships of these subjects with the object of knowledge and, thus, analyze and explain data produced from the transcripts of the filming of the formative meetings, without losing sight of the objective and the problem of this investigation.

In this context, it is important to justify that we refer to the concept of measurement, driven by the factors: relevance given to this concept by the participants of continuing education due to the need for theoretical and methodological deepening of it; awareness of research participants that the concept of measure, in fact, is the general basis for the process of appropriating the concept of number (DAVIDOV, 1982).

It was possible to verify, for example, in the statements recorded below, that teachers understand that the concept of measurement was elaborated from the concrete needs of men in the process of evolution of humanity: Teacher T2: "in this matter of time [...] then when he settled in, maybe the need for time arose. He was going to plant ... When will he be born? [...] How long will it take to get to a place, the shortest distance [...] a certain space of an object, organize the furniture, in short, you organize this space in a rational way. Cut a fabric without wasting "(Videography / Formative Encounter); and Teacher T1: "we

measure out of curiosity, because of the need for control, to make sense of what we do, to plan, so as not to waste time, energy and materials, to perceive the evolution" (Videography / Formative Meeting).

In this same episode, another revealing aspect of evidence of appropriation of the concept of measure that deserves to be highlighted, is the understanding on the part of some teachers that, although still in the condition of nomad, the measure was already presented as a necessity imposed on men. To prove our observation, as an example, we present the statements: Teacher T3: "[...] the measure of time, it exists even in nomadic peoples" (Videography / Formative Meeting); and Teacher T1: "exactly, even though I am a nomad, I think there is a need for guidance" (Videography / Formative Meeting). In this regard, Teacher T1 understands that the measure "[...] consists of a human need, so we thought about it, you will talk about the generic man, the history of humanity in this need for measurement. So, when you put it today you will reverse history "(Videography / Formative Meeting). However, we still observe that Teacher T2 is partially antagonistic about the understandings of teachers T1 and T3. In his view, the need for the measure arose only when man stopped being a nomad.

Regarding the meanings presented by teachers T1, T2 and T3 about the human need to measure, opportunely, we emphasize that, according to the study developed by Maldaner (2011) about the history of civilizations, since ancient times, men felt the need to discover ways of measuring objects, mainly due to the abandonment of nomadic life and the need to form communities, cities and kingdoms. In the study undertaken by Maldaner, the author presents the case of the Egyptians, who developed a complex system of measures as a result of the annual floods of the Nile River.

For corroborating these statements, the contributions of Silva (2004, p. 38, emphasis added) are valuable:

> Primitive man did not need a very elaborate measurement system. Their metrological needs were certainly only for some rustic indications of positions, approximate distances and ratios of quantities such as 'greater than', and 'heavier than' or 'less than' and more 'lighter than'. However, from the moment it was necessary to cultivate the land or transfer the animals to more fertile pastures, there was also the need to communicate more conveniently in metrological terms, and it may have been at that moment that the first units of measurement appeared. And for ease, they were based on dimensions of the human body. Which took itself as the standard of measurement.

Regarding the theoretical contributions of Silva (2004), it is pertinent to emphasize that the analysis we made of Teacher T3's speech, according to the record, "what I had thought was that some things are dimensions of the body itself, dimensions of an object [. ..] "(Videography / Formative Encounter), is in line with what was explained by the aforementioned author, that is, that in the action of measuring, initially, men used their own body parts as units of measurement.

Thus, still regarding the analysis of the data selected for this episode that deal with the reflections undertaken by the teachers on the appropriation of the concept of measure, we find evidence that, in this movement of appropriation, the study of the history of the concept is one of the guiding elements of the

work educational organization. Understood in this way, the concept's history enables the process of appropriating mathematical concepts. In this regard, as remembered by Lanner de Moura (2007, p. 73), in the theoretical perspective adopted in this investigation about the study of the history of the concept, it is understood "[...] not in the factual, chronological, fortuitous sense, but in its fundamental meaning: of man creating himself through the development of his conceptual rationality ".

Still on this issue, we consider it pertinent to highlight that the history of the concept alone is not a satisfactory pedagogical instrument, since we also need to define as a methodological premise the unity between the logical and the historical, assuming that the logical is the abstract interpretation of history (KOPNIN, 1978).

Continuing the analytical process of the data selected for this episode, there were also evidences of the teacher's awareness that in the process of appropriating the concept of measure, initially, he needs to appropriate the culture brought by the students, or better, of the knowledge empirical results for them hitherto appropriate. To illustrate, we highlight Teacher T3's reflections: "[...] then she will bring with her the culture she has to situate that particular measure [...]" (Videography / Formative Meeting). These reflections corroborate the ideas of Vigotski (2008, 2009). For this theorist, the thought does not pass directly to the subjects, much less the empirical thought is automatically subsumed by the theoretician-scientific, since it is only "[...] in the dialogical-pedagogical walk that the two orders meet of concepts: everyday concepts are incorporated and surpassed by scientists. " (GASPARIN, 2011, p. 115).

The analysis of the data also revealed that, in the movement of teaching learning provided by continuing education about the appropriation of the concept of measure, teachers faced the need to appropriate other concepts related to the measure - the conceptual nexus, defined by Lanner de Moura (2007, p. 73) as those concepts that constitute "[...] the concept in its complexity, and which are part of its creation dynamics [...]". Among others, we identified in the fragments of the speeches of the participating teachers: comparison (Teacher T1), quantity (Teacher T1), quality (Teacher T1, Teacher T4), greatness (Teacher T1, Teacher T2), measurement standard / measurement units (Teachers T2, T1 and T3) and tools / instruments (Teachers T1, T2 and T3).

Thus, we verified the meanings and importance given by the investigated teachers of the conceptual nexus with a view to learning the mathematical concepts. It is interesting to note that in this discussion, in the opinion of Teacher T1, only "[...] through measurement does man manage to numerically express the quality of a phenomenon or an object" (Videography / Formative Encounter) and that greatness is a number that expresses quality. In the same way, in Teacher T2's reflections, we observe a reflection that meets Teacher T1's reasoning: "[...] I can only talk about the measure when I also make the relationship with quality [...] I measure that that will satisfy my need in the relationship that I have established. " (Video recording / Formative Meeting).

In this way, the teachers mentioned share, among other meanings, that quantity can only be measured when compared to quality and quality as the variation of greatness. That is why when we think about measurement we are thinking about its qualities with the object to be measured.

Understood in this way, it is pertinent to emphasize that the qualities of an object depend on the environment in which it is inserted, on the functions of the section of reality arbitrarily cut out (CARAÇA, 2010). As an illustrative example, if we compare the quantities of 1000 butterflies and 1 donkey just for

the discrete aspect, the number of butterflies is greater than that of a donkey, however, under the continuous aspect, when comparing the mass of the donkey with the mass of the 1000 butterflies , the mass of the donkey will be much greater.

Continuing the analysis, in excerpts from the statements of teachers T3: "[...] some people may have thought like 'we measure?', That is, what standard of measures we use and not what tools we use" (Videography / Formative Meeting); T1: "I think there is a distinction between a measurement unit and an instrument" (Videography / Formative Meeting); and T2: "with which units and with what instruments? Unit of measurement not necessarily" (Videogravure / Formative Encounter), it is observed the importance that these teachers give to the conceptual nexuses: standard of measures, units of measurement and tools / instruments, for example understand that there is a difference between these attributes.

Regarding this manifestation, Caraça (2010) explains that as a result of becoming aware of the need not to limit ourselves only to knowing whether a given object is greater or less than another, through perception, without instituting a standard measure, there is a need to we also know how much this object measures. That is why we carry out procedures, among others, the establishment of a measurement standard in the process of comparing quantities of the same species - unit of measurement so that we can answer the question: how many times? Thus, in the movement of appropriation of the concept of measurement, there is a need for a number that expresses the product of the comparison with the unit - the measure of greatness in relation to the established unit.

Episode 3 - Synthesis of the overcomes made possible by the continuing education of mathematics teachers

According to Bernardes (2012), teacher training with the structure of "activity", in the perspective advocated by Leontiev, combined with the methodological principle of AOE, in which the subjects experience the transformation of the way of organizing teaching, consequently, enables the these subjects involved overcoming their pedagogical activity. In the case of this research, the analysis of the data produced in the teaching learning space created by continuing education, at different moments of the formative meetings and the reflective session, meets the proposal of Bernardes (2012). Why do we score this? Because the experience in this project of continuing education has positively affected teachers both in the form and content of thought, as well as in professional and personal changes.

The observation and analysis of the records of the teachers' statements T4: "[...] the theoretical-methodological perspective used here contributed to me learning what I had not learned in my entire training process. It is not just learning, but how I had no idea how to teach a 1 year old child the combination 1 to 1, for example [..] My view of this teaching today is completely different [...] The process of appropriating the theory allows a better reading of the school routine, of the many contradictions that we experience [...] Furthermore, the constant incentive to study enables our motives and leads us to build precious meanings, those that make us wake up and remember how much our role as a trainer and teacher is important "(Reflective Session); and T3: "[...] in the construction of the collective, everyone learns, builds himself as a person who mediates knowledge in the classroom [...] So ... I feel like this ... I feel built in group [...] The group has the characteristic of humanizing [...] It helped us to be better in all subjects and

to look at the student in a different way, with all his needs, in all his discoveries "(Reflective Session), explicitly confront the proposition of Bernardes (2012) already announced.

In this perspective, they are made explicit in the reflections of Teacher T4 and T3, who, in addition to continuing education, modify the form and content of the thought of their thoughts have changed themselves. In this episode, we also observed that Teacher T8 corroborates the ideas of this teacher, stating that: "I had a lot of difficulty in Mathematics as a student and then as a teacher too, especially when I worked with 3rd and 4th years ... 3rd. and 4th grade. I had to study a lot to work on that content with the students. It didn't come out that easily, fluently. I had to study a lot. And I was very concerned that my students would really learn. Today that is much clearer in this question of the concept, to appropriate the mathematical concepts and throughout my practice, sometimes I taught some little secrets like that [...] It is the way we learned Mathematics, that difficulty that I felt as a student, I had this concern that my students would not feel [...]. " (Reflective Session).

Another point to be highlighted is that, when reflecting on continuing education, teachers T4, T3 and T8 share the same ideas regarding the possible professional and personal changes impacted by this training. In the analysis undertaken of the conversations of these teachers, it is evident that the training actions proposed by continuing education, mediated by the reflection process among the participants, positively affected the organization of the teaching of Mathematics, when they became aware of the importance of theory in the learning activity.

In this regard, we understand that it is the theory (or theoretical-scientific knowledge) that underlies the actions and operations of teachers in relation to the teaching organization, by mediating the process of raising awareness about the possibilities of learning, as well as the possibility of transforming praxis. in pedagogical activity (BERNARDES, 2012). Thus, as observed in the dynamics of the training actions proposed by continuing education, particularly in the AOE, the appropriation of a theory aimed at the development of consciousness, impacting on the formation of theoretical thinking, allows the subjects involved in the learning activity to develop meanings to his pedagogical activity, like Teacher T7, as recorded in the speech: "I learned a lot about mathematics, about the fundamentals, the concepts, the essence of the concept. Searching for this essence, in fact, I learned here and not during graduation. " (Reflective Session).

Regarding the reflection of Teacher T7 and the other collaborating teachers in this discussion, it is interesting to highlight that the collective organization of the training actions of the continuing education enabled these teachers to produce new meanings about the pedagogical activity, as a result of the actions being motivated. It is worth remembering that, due to the Historical-Cultural Theory / Activity Theory, the reasons depend on the development of actions (LEONTIEV, 1978, 2010). Referring to this problem, Moretti (2007, p. 120) brings us relevant considerations:

> In this process, the new proposed actions aimed to objectify the new motive and, in this way, there is a coincidence between this and the objectified product. Thus, the organization of teaching, when reason and object coincide, becomes a teaching activity for the teacher. When producing new reasons in the course of the activity itself, the teacher also begins to attribute new meanings to it, which includes new

> meanings to his actions, the instruments he chooses and the collective work process that created conditions for the perceived changes.

Thus, we share the thought of Moretti (2007), especially when stating that "[...] when producing new reasons in the course of his own activity, the teacher also starts to attribute new meanings to it, which includes new meanings to his actions, the instruments you choose and the collective work process ". Here we emphasize that, in the first months of research, next to the teaching learning space provided by continuing education, an aspect that called our attention was the fact that when we discussed the key concepts of the guiding theory of this study, with an emphasis on movement historical logical of the mathematical concepts, from the development of activities that trigger learning, according to the perspective of the AOE, the participation of the subjects of this research, became more and more questioning about the formation proposed by the project in focus. This brought overcoming the organization of mathematics teaching, due to the development of teachers' awareness, in particular, in the dimension of mathematical theoretical-scientific thinking, as seen in the analysis of previous episodes.

In this perspective, from the analysis of this last episode, we conclude, therefore, pointing out that the continued formation in the perspective of the Historical-Cultural Theory / Activity Theory positively affected the teachers, subjects of this research, by triggering professional and personal changes and new possibilities in the organization of mathematics teaching.

Final considerations

In view of the revealing evidence of the movement of the appropriation of mathematical concepts from the three episodes presented, we interpret that the continuing education in the perspective of the Historical-Cultural Theory / Activity Theory, had an impact on the organization of teaching in Mathematics of these teachers, as well as they produced and shared meanings.

First, because we observed that teachers during their experience with AOE, with emphasis on situations that trigger learning and from the perspective of logical-historical, gradually, in a dialectical movement, were identifying different elements of the problem situations, commonly worked in the classroom classroom, subsidized by formal logic. Thus, they acquire a level of awareness in the sense that as teachers we must create the need, as well as the objective and subjective reasons and conditions for students to enter into learning activity.

Second, because the referred continuing education consisted of several training actions, among others, the development of AOE, considering the historical logic of the concept and the triggering situations of learning, which through rules, conduct and responsibilities, including time, schedules, signs and instruments, collaborative forms of behavior and other variables. Under this meaning, the actions impacted the development of higher psychological functions of teachers, in particular, of reflection, awareness, theoretical-scientific thinking and teaching planning.

In view of these considerations, it is worth noting that continuing education in evidence has also provided us with qualitative leaps not only as a researcher in this formative space, but also as a mathematics teacher. As we developed meanings for our pedagogical activity, this mobilized us to act intentionally

towards the organization of teaching. On the other hand, when appropriating the assumptions of Historical-Cultural Theory / Activity Theory and the methodological principle of AOE, we devised a theoretical-methodological framework to analyze and explain the data produced for this research. In this movement, we were trained as researchers.

Thus, we believe that, among the contributions of this investigation, is the expansion of the theoretical field related to the pedagogical activity of the teacher who teaches Mathematics, especially in Basic Education about the appropriation of mathematical concepts. In other words, a pedagogical activity based on "[...] commitment to the opportunity for the teacher to be part of a movement for the appropriation and mobilization of theoretical and practical knowledge about teaching action" (MOURA, 2000, p. 173). That said, Although this research is restricted to a differentiated teacher training model - we hope that the issues addressed here may have an impact on the mobilization of other reflections on the concept appropriation process.

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Evaluation of the rational use of agricultural space for better human occupation

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Abstract

Changes in microclimates in urbanized areas are due to direct human interference, such as the replacement of wooded areas by paving and construction in inadequate locations. For the study of environments, climatic variables interpreted in isolation have little informative content because its exist in set. Considering the expansion of urban areas over the rural environment, the characterization of anthropized environments has been an important tool for feeding urban projects that, in order to be sustainable, have used comfort indexes in your evaluations. Another resource currently used are decision support systems, such as those that use fuzzy logic, as they assist in the observation of conflicting situations such as those involving environmental issues. Thus, in this research, the human discomfort index (HDI) was used to assess 6 different microclimates and to verify the degree of interference of rural anthropization in human thermal comfort and with the observed information build a mathematical model based on fuzzy logic, relating climatic variables and microenvironments, in which the response variable were levels of human well-being. In the end, it was possible to conclude that the urbanization process in rural areas influences the microclimate and quality of the environments, reflecting human thermal comfort. In addition, the Fuzzy model constructed estimated the observed scenarios in a coherent manner, serving to assist in the management of agricultural environments and decision making.

Keywords: Anthropization; environmental comfort; fuzzy logic; expert system.

1. Introduction

The vegetation directly influences the local climatic elements known as microclimate, being considered a natural method to reduce the incidence of solar radiation, resulting in benefits such as lowering the temperature, maintaining air humidity, wind and rain (FERREIRA; HERRMANN, 2016).

According to De Freitas; Costa (2018), the climatic changes caused by the urbanization process of a rural area start by altering the surface, where a green area is replaced by buildings, causing a greater heat production of the urbanized area itself, changing the composition of the atmosphere of that urban area. microclimate, causing the production of gases previously not produced in that location.

The increase in temperature in urbanized areas, mainly in the microclimate, happens due to the direct interference of man, such as replacement of wooded areas by different coated areas, constructions in inadequate locations, movement of motor vehicles, in addition to the verticalization of buildings, intensifying heating and air cooling (MARTELLI; SANTOS JR., 2015).

The urbanization process is usually conceptualized as the increase of the urban population in relation to the rural population, and in this sense urbanization only occurs when the percentage of increase in the urban population is higher than that of the rural population (SILVA *et al.,* 2014). However, according to Li *et al*. (2018) there has been a conceptualized process as rural urbanization, resulting from urban housing problems, urban-rural inequality that cause differences in the quality of life, excessive development of those who live on the land, loss of agricultural areas if not used and increase in values and energy consumption in urban areas.

According to Oliveira et al. (2006), the climatic variables available in isolation are information with little informative content, given the existence of the binomial temperature / relative humidity of the air, influence of the wind, pockets of heat and cold, among others. According to Buriol et al. (2015), in average terms, the conditions of discomfort due to low temperatures occurred in the morning, around 6 am, and by high temperatures, in the afternoon (3 pm).

According to the IPCC (2014), in a climate change scenario, where it is predicted that the number of extreme events of high temperatures and intense rains will increase, strategies to make vegetation compatible in densely built areas become even more important.

From the ambience, well-being is defined as the feeling of comfort having several levels, stress is a syndrome that affects physiological, productive and reproductive reactions and behavior, which in turn, can be described as the unique act, or a series of joint activities, resulting from some environmental stimulus (SANTOS, 2018).

The thermal comfort of a person in a given environment is defined as the result of a satisfactory combination in that environment, of the average radiant temperature, relative humidity, temperature and relative air speed, with the activity developed (metabolism) and the thermal insulation of the clothing at levels qualified as comfortable (DISCOLI et al., 2014).

According to Wiebusch et al. (2017), the correct assessment of well-being, in order to offer adequate comfort environments, requires investments in research, common in the area of Applied Ambience.

The assessment of anthropized environments has been an important tool for the feedback of urban projects, both in the building scale and in the environmental conservationist (SILVA; FREITAS, 2016). Researchers have proposed various indices encompassing varying climatic to assist in environmental assessment, including highlighting the Human Discomfort Index (HDI) that relates the air temperature varying temperature and dew point , described by Ono and Kawamura (1991) and the Human Well-Being Index (HWBI) that allows measuring well-being and was presented by YANAGI JUNIOR et al. (2012) .

Decision support systems have emerged with the intention of assisting in the observation of conflicting situations and more sustainable management of environmental issues. However, most simulations use incomplete databases or even unknown information, generating answers that are not always reliable (MA et al., 2018). It is to resolve this issue that the use of decision support systems based on fuzzy logic in the assessment of environmental issues is increasingly common.

According to Conde (2019), environmental management is composed of a set of managerial and operational practices that aim to improve sustainable environmental performance, however due to the uncertainty of the observed variables an alternative is the use of fuzzy logic as a management tool to observe different compositions of scenarios , because as a specialist system, it generates models with results that provide a

greater degree of certainty for intervention.

Based on the above, the objective of this research was to evaluate the environmental conditions that represent different types of occupation in an urbanized rural area, comparing microclimates, and to represent the studied scenario in the form of a mathematical model based on fuzzy logic.

2. Material and Methods

The experiment followed two stages of execution:

• Field Experiment: In this stage, field data were collected in 10 different microenvironments, the human discomfort index (HDI) was calculated and the information was evaluated according to the literature;

• Construction of a mathematical model: Using information from the literature and knowledge of the specialist, a model was built with fuzzy logic, relating climatic variables and microenvironments, in which the response variable was levels of human well-being.

2.1. Field Experiment

The experimental part of the research was carried out with data collected at the Federal University of Grande Dourados (UFGD) and Embrapa Agropecuária Oeste, INMET station, municipality of Dourados - MS, Brazil.

10 days of data were collected and considered in the summer with similar climatic characteristics, between Dec / 2019 and Jan / 2020.

Temperature (T) and relative humidity (RH) were recorded, and the collection at UFGD took place with an automatic data acquisition system that recorded the hourly averages from 6:00 am to 6:00 pm. In INMET, T and RH information was made available on the official website of the climate agency.

With the values of T and RH, the HDI was calculated using Equation 1 described by Ono and Kawamura (1991).

$$HDI = 0{,}99T_a + 0{,}36T_d + 41{,}5 \quad (1)$$

Where:

T_a = air temperature, in ºC;

T_d = dew temperature, in ºC.

Being T_d calculated by Equation 2:

$$T_d = \frac{b * \alpha(T_a, RH)}{a - \alpha(T_a, RH)} \quad (2)$$

$$\alpha(T_a, RH) = \frac{a * T_a}{b + T_a} + \ln(RH) \quad (3)$$

Where:

a = 17.27

b = 237.7

Ta = air temperature, in ºC;

RH = relative humidity divided by 100 (one hundred).

The classification of comfort levels in each microenvironment using the HDI took place according to Table 1, adapted from Santos and Melo (2010).

Table 1. Intervals and respective effects on the application of the HDI.

HDI RANGE	IT IS MADE
HDI> 80	Heat Stress
75 <HDI <80	Uncomfortable Heat
60 <HDI <75	Comfortable
55 <HDI <60	Uncomfortable Cold
HDI <55	Cold Stress

Source: Adapted from Santos and Melo (2010).

The T and RH sensors were positioned at 1.5 m from the ground to reflect the reality of the climate microenvironment of interest in locations shown in Figure 1.

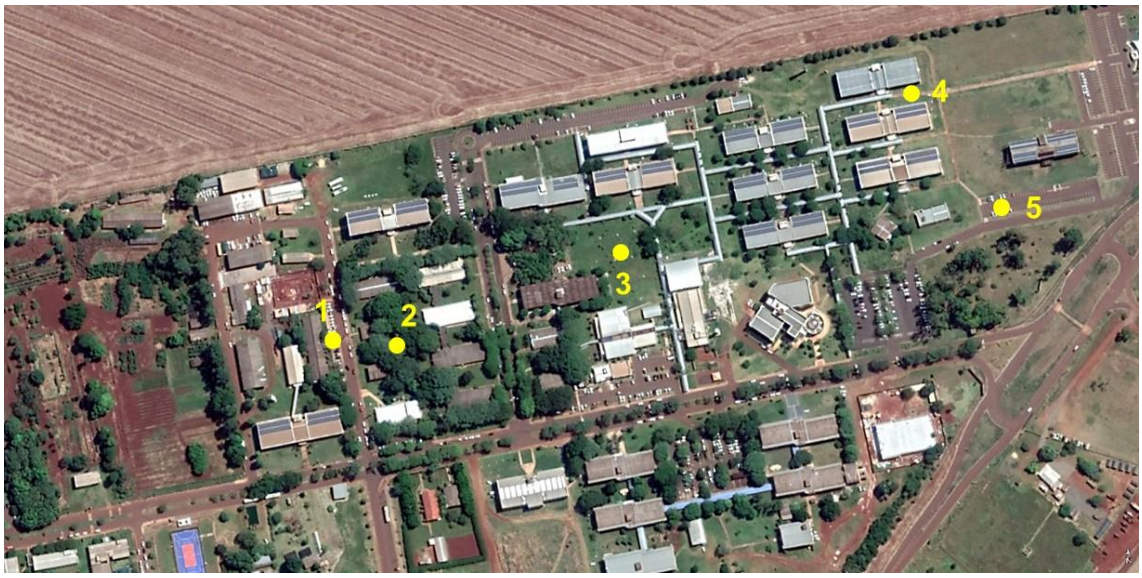

Figure 1. Climatic data collection points at UFGD.

Source: Google Earth-MAPAS (2020)

Microenvironments are characterized as follows:

- **point 1:** area without shading and concrete floor;
- **point 2:** area with trees and grassy floor.
- **point 3:** area without shading and grassy floor.
- **point 4:** area between two buildings and grass floor;

- **point 5:** area without shading and asphalt floor.
- **point 6:** INMET meteorological station, 15km away, grassy ground and without lateral obstacles.

The HDI averages were subjected to analysis of variance and Tukey average test ($p \leq 0.05$) with the Sisvar® software (FERREIRA, 2019) to compare the different microenvironments. The experiment was carried out in a factorial scheme (6 x 13), with 6 microenvironments and 13 observation times, in randomized block design, with 10 experimental days (repetitions).

With the characterization of the types of occupation of areas in UFGD and INMET for field situations it was possible to verify the interaction of the HDI, use of areas and levels of well-being, making it possible to build a fuzzy model with these three variables so that it could be used in numerous simulations in addition to those observed in the field.

2.2. Construction of a mathematical model

To build the Fuzzy model, the MATLAB® software was used. The type of occupation of the area and the human discomfort index (HDI) were entered as input variables. From the interaction resulting from the inputs, the system estimated the human well-being index (HWBI) as the output.

Mamdani's inference method and its respective degrees of relevance were used, through the minimum operator, superimposing the rules through the maximum operator. For defuzzification the Area Centroid method was used, considering all possibilities of exit, resulting in a base of activated rules.

The first input variable was the type of occupation of the area in different microenvironments. This linguistic variable followed the conclusions of DOS SANTOS et al. (2011) who, when assessing the comfort levels provided by different types of environments, found that asphalt cover and waterproofed areas are less comfortable than points covered by vegetation. On the other hand, places between buildings, even with plant floors, present intermediate environments, as they have difficulty in ventilation and retain heat. And the best environments are those with tree coverings, which provide ventilation and natural shading. Table 2 presents this membership function.

Table 2. Relevance functions for the type of occupation of the area.

Value	OCCUPATION
[0.70 0.80 1 1]	Wooded
[0.45 0.55 0.70 0.80]	Edified
[0.20 0.30 0.45 0.55]	Lawn
[0 0 0.20 0.30]	Paved

As in a thermal environment, temperature variations are directly related to the relative humidity of the air, and these are represented in the human discomfort index (HDI), this was the second input variable in the set. The HDI membership function with its ranges of values were represented as in Table 3:

Table 3. Relevance Functions for the HDI.

Value	IT IS MADE
[78 82 100 100]	Heat Stress
[73 77 78 82]	Uncomfortable Heat
[58 62 73 77]	Comfortable
[53 57 58 62]	Uncomfortable Cold
[00 00 53 57]	Cold Stress

Source: Adapted from Santos and Melo (2010).

And finally, the output variable, Human Well-Being Index (HWBI), presented by YANAGI JUNIOR *et al.* (2012) allowed the indication of the level of well-being in the analyzed microenvironments. Its set was established in a domain of [0.1], as shown in Table 4.

Table 4. Relevance functions for HWBI.

Value	IT IS MADE
[0.75 1 1]	Very good
[0.50 0.75 1]	Good
[0.25 0.50 0.75]	Average
[0 0.25 0.50]	Bad
[0 0 0.25]	Too bad

For the construction of the mathematical model, the input and output variables were related by means of fuzzy rules, in the form of linguistic sentences based on the literature and assistance from experts.

3. Results and Discussion

Through statistical analysis it was found that for the HDI, there was a significant difference between treatments because F was greater than Critical and P less than 0.05. Thus, he continued up to the test Tukey test at 5% significance where it was identified that the only treatments that showed no significant difference between them was 3 (green) and INMET. This can be explained by the fact that these two regions are similar, grassy and exposed to the sun, without any kind of shading. The other areas, on the other hand, represent different microclimates and therefore differences between them.

According to Nunes (2002), the alteration of the so-called primary nature in second nature, or transformed nature, intensified from the urbanization process, preceded by an intense industrialization and demographic growth, which culminated in the so-called urbanized rural area that provides the appearance of microclimates distinct even if close.

Analyzing Figure 2, it appears that the mean HDI values have similar behaviors, but express different physiological reactions in thermal comfort throughout the day. Considering the HDI comfort bands proposed by Santos and Melo (2010), it is possible to observe that the arboreal environment is the only one that does not reach the region of thermal stress although it is uncomfortable after 11 am. Locations with

waterproofed pavement (concrete and asphalt) are the most aggressive results, and already enter the heat stress zone after 9 am, staying there all day.

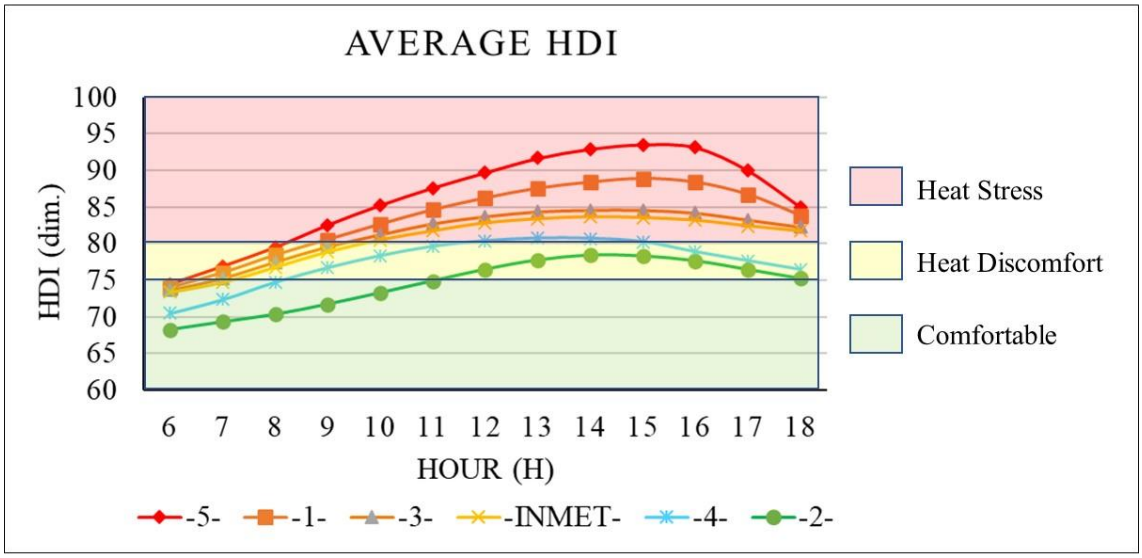

Figure 2. Average hourly HDI of the area. Source: The Authors.

The best result for the wooded region is confirmed by LIVESLEY *et al*. (2016) when stating that, if properly planned in favor of environmental quality, a vegetation system using trees significantly reduces heat islands through shading and evapotranspiration. And De Souza *et al*. (2019) found a reduction of 37.37% in the levels of exposure to thermal stress with the planning of tree planting in a region, with thermal comfort being the first characteristic noticed by users.

And the results verified in the waterproofed regions are corroborated by Barros and Lombardo (2016) when they stated that the increase in temperature in the cities is caused by the absence of trees, a high number of buildings and mainly by the areas with concrete and asphalt pavement.

Figure 3 shows the 3D graphic resulting from the fuzzy modeling constructed by inserting information from the literature (HDI and IBEH) and field observations (occupation of areas). Looking at Figure 3, it appears that there is a consistent relationship between HDI and area occupation. In places with high HDI (> 80) the comfort level (IBEH) is improved as it moves away from the paved region (0) and moves towards the wooded region (1). The best situation is represented with comfortable HDI (70) and occupation contributing from the building with partial shading (> 0.6) to the best of them, wooded, with very good IBEH (> 0.75).

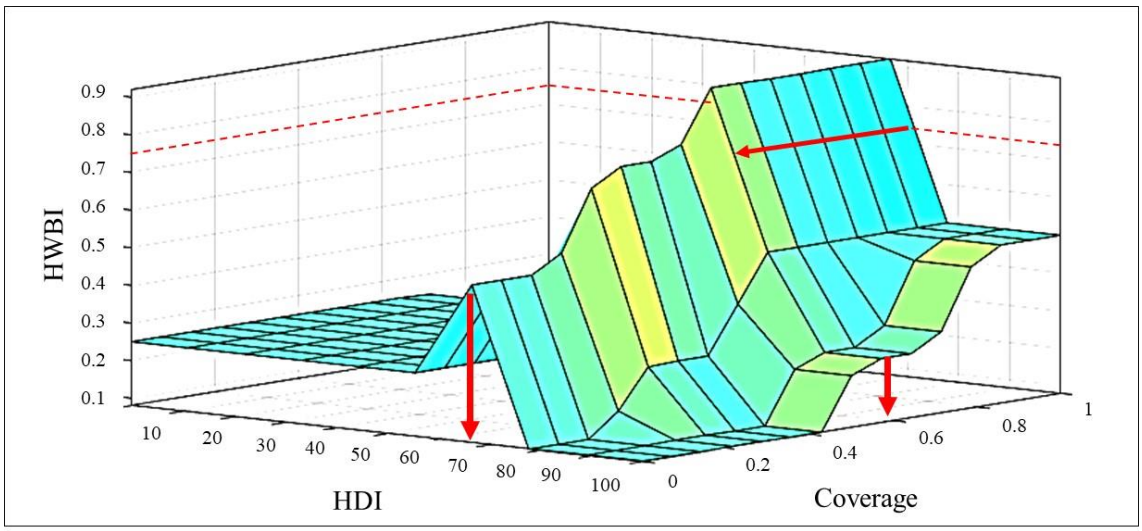

Figure 3. Surface generated by the Fuzzy System. Source: The Authors.

With the use of Fuzzy Logic, it is possible to make precise inference through imprecise linguistic concepts and with a certain degree of ambiguity, such as those observed in the field, in a similar way to what human beings do in the real world. The modeling Fuzzy well-built shows the inaccuracies that humans treat with great skill in real life, but they are usually difficult to represent in traditional sets (AMORIM *et al.,* 2016). As in this research, Lopes et al. (2016) also USER plow Logic Fuzzy to study environments. They evaluated the risk of contamination of a water system with the Fuzzy Logic having as input variables Biochemical Oxygen Demand (BOD) and Dissolved Oxygen (DO). At the end of the research, they emphasized the importance of having a solid method like this for environmental analysis.

It can be seen in Figure 3 as described by De Paula and Souza (2007) when stating that the Logic Fuzzy can be used as a tool for managing uncertain situations, such as environmental ones, as it is contained in the category of non-algebraic map analyzes cumulative or logical analyzes, together with Boolean simultaneity, generating products such as maps integrated to different situations, instead of merged maps such as those resulting from the algebra of geoprocessed maps.

4. Conclusions

The study pointed out the impact of urbanization in rural areas and demonstrated the importance of the microclimate in the quality of environments where, evaluating the HDI, it was noted that the wooded area has the best characteristics to provide human thermal comfort and a region without vegetation cover with asphalt waterproofing. offers great thermal discomfort. The use of the precision ambience proved to be efficient in the assessment of environments and qualitative measurement of different forms of occupation of areas in urbanized rural regions. And the Fuzzy model built estimated the observed scenarios in a coherent way, showing the importance of this type of modeling for the management of agricultural environments and decision making.

5. Acknowledgement

This work was carried out with the support of the Conselho Nacional de Desenvolvimento Científico e

Tecnológico (CNPq) and the Federal University of Grande Dourados (UFGD)

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Predictors of Attitude towards Preparation for Quality Aging in Undergraduate Students

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Abstract

This correlational study aims at investigating important predictors and predictive percentage of psychological and situational factors on attitude towards preparation for quality aging. Samples were 489 undergraduate students. Results from Multiple Regression Analysis on attitude towards preparation for quality aging in total sample yielded 43.07%. The important predictors were future orientation and self-control, social support, and need for achievement. The predictive percentage in subgroups range from 34.86% to 47.89%. The interesting findings were found in some subgroups in terms of different predictors from the total sample. The findings from this study could shed light on increasing favorable attitude towards preparation for quality aging in adolescents. Discussion and implications are presented.

Keywords: Psycho-social antecedents, Attitude towards preparation, Quality aging, Thailand

1. Introduction

Aging population is rapidly accelerated from 963 millions in 2017 to 2080 millions in 2050 [1]. Thailand will reach super aging society within the year 2030 [2]. Preparation for quality aging should be awareness in all population span, especially young generation. Generally, younger people may have misconception about growing old [3] that could lead them to avoid thinking about preparation for becoming elderly. However, in order to accomplish a certain thing, preparation in the beginning will ensure the victory, e.g. preparation of ICT skills for quality education [4].

According to Theory of Reasoned Action [5], it suggested that attitude and intention are the important predictors of behavior. Several previous studies revealed supportive findings of this suggestion especially in health area (e.g., [6]; [7]) that affect quality of life in the future. Therefore, this study aims at investigating

psychological and situational factors that could predict attitude towards preparation for quality aging in undergraduate students.

2. Literature Review

2.1 Attitude towards Preparation for Quality Aging

It has long been evident that attitude and object attachment are separated, but related [8]. Attitude is a psychological construct. Many scholars ([9] ; [10]) indicated that attitude consisted of three dimensions. First, cognitive aspect involves the beliefs and thoughts that would associate to an object or a behavior. Second, affective aspect covers feelings or emotions about a certain object or behavior. It can be positive or negative ways. Third, behavioral intention aspect is confused with behavior in some areas of study. It is referred to commitment, readiness, or intention to an object or behavior. Most of attitude measures are in the form of self-report with summated rating scale [11].

In this study, attitude towards preparing for quality aging is defined as three aspects, namely, cognitive, affective, and behavioral intention regarding making plans or getting ready to become successful aging in the future.

2.2 Psychological Traits and Attitude towards Behavior

In this study, four psychological traits were investigated as the antecedents of attitude towards preparation for quality aging. First, core self-evaluation involves positive thinking, low anxiety, having confidence and high self-esteem [12]. In previous studies, it was found that core self-evaluation was related to attitude towards behavior, especially in terms of satisfaction ([13]; [14]).

Second, mental health associates with stress, anxiety, psychological well-being. Good mental health persons tend to have appropriate attitude towards behavior, e.g., attitude towards suicide [15], attitude towards buying behavior [16], as well as satisfaction [17].

Third, the ability to foresee the positive and negative consequences of one's own actions, and the ability to control oneself to achieve goal as planned is related to a psychological characteristic, called future orientation and self-control [18]. Previous studies revealed the strong positive relationship between this psychological trait and attitude towards desirable behaviors [19] .

Fourth, Based on McClelland's theory [20], individuals with high need for achievement usually have committed to put efforts and resources to accomplish a task. Easily give up in doing something before achieving the goal is less likely to happen. There were some evident that need for achievement is related to attitude towards behavior ([21] ; [22])

2.3 Situational Factors and Attitude towards Behavior

Three situational factors are investigated in this study. First, social norm refers to expectations from significant others. It is one of important constructs in theory of Reasoned Action [5]. Previous studies revealed similar findings that social norm regarding to a certain object or behavior is associated with attitude towards behavior, e.g., attitude towards cooperate social responsibility behavior [23], attitude towards becoming professional farmer [24].

Second, supports from significant others also affect one's behavior. Social support is a multi-dimensional construct. Scholars at least agree that there are three dimensions of support, namely, emotional, informational, and material ([25] ; [26]). Previous studies found that individuals received social support also reported favorable attitude towards desired behaviors ([27] ; [28])

Third, role modeling, according to Bandura's Social Learning Theory, involves perceptions in terms of actual seeing or hearing of desirable behaviors displayed by significant others. Several previous studies revealed the that having good role model related to attitude towards desire object or behaviors ([29] ; [22])

3. Research Methodology

3.1 Samples

Five hundred undergraduate students in junior level from three universities in Thailand were asked to filled out questionnaires. Only completed data from 489 undergraduate students were employed. They consisted of 134 male students and 355 female students (27.40% and 72.60%, respectively). The average age of these student was 21 years. They received the monthly allowance with the average of 5,045 Bahts.

3.2 Measures

There were four groups of variables in this study. These variables were mostly assessed in the form of summated rating, consisted of 7-15 items for each variable. Six-point rating scale ranging from "absolutely true" to "absolutely not true" was attached with each item. The item quality was tested by two statistical approached: item discrimination (t-ratio) and item-total correlation. Construct validity for each measure was tested by confirmatory factor analysis. The reliability for each measure was computed. Details are in Table 1.

Table 1 Item and measurement quality

	Measure	No. of items	Range of t-raito	Reliability (α)	Confirmatory Factory Analysis						
					χ^2	df	p-value (p>0.05)	RMSEA (≤0.06)	CFI (≥0.95)	TLI (≥0.95)	SRMR (≤0.08)
1.	Attitude towards preparation* (AP)	12	4.94-8.52	0.84	56.84	47	0.15	0.04	0.97	0.95	0.06
2.	Core self-evaluation (CSE)	12	2.02-3.24	0.79	37.68	40	0.57	0.00	1.00	1.01	0.07
3.	Mental health (MH)	12	5.45-8.68	0.86	41.10	44	0.59	0.00	1.00	1.01	0.05
4.	Need for achievement (nAch)	12	2.88-7.68	0.75	48.58	47	0.40	0.01	0.99	0.99	0.06
5.	Future orientation and self-control (FS)	11	3.82-7.05	0.70	50.30	39	0.10	0.05	0.95	0.93	0.07
6.	Social norm* (SN)	7	2.78-4.85	0.68	10.30	11	0.50	0.00	1.00	1.01	0.40
7.	Social support* (SS)	15	2.45-8.52	0.71	46.10	44	0.38	0.02	0.99	0.99	0.79
8.	Role modeling* (RM)	14	4.46-8.48	0.81	73.40	63	0.17	0.04	0.97	0.96	0.07

Note: * Constructed or adapted by the researcher.

Attitudes toward preparation for quality aging (AP) consisted of three dimensions ([30] ; [31] of preparation for quality aging, namely, cognitive aspect (e.g., aware of necessity for preparation, perceive benefits of preparation), affective aspect (e.g., admire the ones who searching for becoming successful aging feel nervous when thinking about preparation for aging), and behavioral intention aspect (e.g., ready to search for information on preparation for aging, willing to participate in seminar or training regarding quality of life).

The psychological trait group consisted of four variables: 1) core self-evaluation consists of four dimesions: self-esteem, generalized self-efficacy, neuroticism, and locus of control which is based on [32]. 2) mental health (MH) involves low anxiety and emotional stability. 3) need for achievement (nAch), based on McClelland's theory of motivation [33] refers to a person's desire or drive to accomplish tasks, skills, or assignments. 4) future orientation and self-control ([34] ; [35]) (FS) is defined as thoughts or anticipation of a person about future consequences from their own actions and ability to control oneself.

The situational factor group consists of three variables, namely, 1) social norm refers to the expectations from significant others (e.g., senior students, superstars) of what one should do according to the preparation for quality aging. 2) social support (SS), [25] and [26] is defined as receiving three dimensions of help from significant others: emotional, informational, and material support. 3) role modeling (RM) involves report of having good exemplar from significant others (e.g., family members, relatives, friends) in preparation for quality aging

3.3 Data Collection and Statistical Approach

Data were collected during January to March 2019. At the beginning of data collection session, the researcher described the objectives of the study, as well as rights of participants (e.g., can terminate at anytime, no specific individual will be mentioned in the study). It took about 50 minutes for data collection in each session. The statistical analysis used in this study was Multiple Regression Analysis (MRA) both enter and stepwise. Data were analyzed in total sample and subgroups.

4. Results

The results from Table 2 indicates that correlational coefficients in this study range between 0.119 ($p<.01$) to 0.648 ($p<.01$).

Table 2 Correlation, mean and standard deviation in total sample

	Variables	Mean	SD	1	2	3	4	5	6	7	8
1	at	50.511	8.025	1							
2	cse	48.303	7.323	.422**	1						
3	mh	40.671	10.490	.227**	.533**	1					
4	nAch	51.558	6.750	.505**	.554**	.119**	1				
5	Fs	48.744	7.481	.580**	.508**	.197**	.648**	1			
6	sn	27.736	5.307	.405**	.364**	.210**	.412**	.447**	1		
7	ss	59.247	9.153	.502**	.474**	.283**	.430**	.442**	.548**	1	
8	rm	52.836	9.458	.304**	.382**	.267**	.291**	.295**	.319**	.422**	1

Note: * $p<.05$, ** $p<.01$

By performing Multiple regression analysis on attitude towards preparation for quality aging using psychological characteristics and situational factors as predictors, the result in total sample reveals that all 7 predictors yield predictive amount of 43.07%. The important predictors by descending beta order were future orientation and self-control, social support, and need for achievement. The predictive percentage in subgroups range from 34.86% to 47.89%.

Table 3 Multiple regression analysis on attitude towards preparation for quality aging

Group	Cases	Predictive %	Predictors	Beta*
Total	488	43.07	fs,ss, nAch	0.36,0.28,0.16
Male students	133	34.86	fs,sn	0.43,0.28
Female students	354	45.88	fs,ss, nAch,mh	0.36,0.27,0.17,0.09
Young students (≤ 21 years)	249	39.27	fs,ss,	0.43,0.30
Old students (>21 years)	238	47.89	fs,ss, nAch	0.37,0.27,0.20
Low GPA students (≤2.87)	244	38.35	fs,ss	0.45,0.28
High GPA students (>2.87)	243	45.45	fs,ss, nAch	0.3,0.31,0.20

Note: * all beta are significant at $p<.05$.

5. Conclusions, Discussion and Recommendations

This correlational study aims at pinpointing the important predictors and discovering predictive percentage of psychological and situational factors on attitude towards preparation for quality aging in undergraduate students. The results from Multiple regression analysis revealed important predictors of attitude towards behavior in terms of both psychological and situational factors. The similar findings were also found in previous studies in predicting psychological state ([36] ; [37])

Furthermore, the findings indicated that future orientation and self-control was the most important psychological predictor of attitude in total sample and all subgroups. The recent studies also found the similar results ([24] ; [38]). For example, a study of the predictors of attitude towards CSR in undergraduate student also revealed that future orientation and self-control was the important predictor of this attitude [39] .

As for situational predictor, the findings revealed that social support was the most important predictor of the attitude in total sample and most of the subgroups. In male students, it was found that social norm is the most important situational predictor of attitude, instead. It can be concluded that male students' attitude towards preparation for quality aging is increased via indirect perception of expectations from group conducts. In this case, male students would have favorable attitude towards preparation for quality aging by being expected from significant others in preparing to become growing old. On the other hands, female students tended to respond to the direct action towards them. By receiving social support from significant others it could affect as the reinforcement for female students to enhance favorable attitude towards preparation for quality aging. It also should be pointed out that need for achievement was found as another important psychological predictor of attitude in total sample, and especially in female students, old

students, and high GPA students. The previous studies also found that need for achievement was the vital predictor of other attitudes in these similar subgroups [40]

Based on the findings from this study, it is suggested in general that in order to increase attitude towards preparation for quality aging in undergraduate students, the following psychological and situational factors should be heightened. As for psychological factors, the two psychological characteristics should be trained in undergraduate students, they are, future orientation and self-control, as well as need for achievement. For situational manipulation to increase this certain attitude, social support regarding preparation for quality aging to undergraduate students in terms of emotional, informational, and material aspects are encourage.

As for future studies, the recommendations are as follows: 1) future study on the antecedents of attitude towards behavior in undergraduate students should include future orientation and self-control, need for achievement, and social support as antecedents. 2) Due to some psychological and situational predictors were left from multiple regression analysis, it is suggested to use path analysis in order to discover indirect effects of these predictors (e.g., mental health, core self-evaluation, role model) on attitude towards behavior. 3) These set of predictors can be used to investigate in other types of samples, e.g., secondary school students or early adults in order to create body of knowledge to shed lights for better preparation for quality aging.

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University Library and Accessibility in the Remote Assistance to Users with Sensorial Disability

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Abstract

In a context marked by mandatory social distancing as a measure of fighting the Coronavirus Disease 2019 (Covid-19), the Universidade Federal do Maranhão (UFMA) library had to intensify offering their services remotely. Therefore, we analyzed how these services are disseminated through the website for the users with sensorial disabilities. We performed a documental analysis, evaluated the library's website through the "Web for all movement" organization, and through direct observation of the services made available by the library's website. Accessibility and communication problems for users with sensory disabilities included the inexistence of audio description for blind users and the interpretation of the Brazilian Sign Language by the avatar, which does not meet the informational necessities of deaf users. Given the observed facts, we found that UFMA's library has to articulate improvements regarding the rules of communication accessibility aiming for information democratization, autonomy and promotion of social and educational inclusion of the disabled person.

Keywords: university library; sensory disabled users; web; accessibility

1. Introduction

In face of the global pandemic scenario caused by the Coronavirus Disease 2019 (Covid-19), on March 23rd 2020 the University Library of the *Universidade Federal do Maranhão* (UFMA) began to remotely assist its users. This assistance included providing guidance on the standards of the Brazilian Association of Technical Standards (ABNT), issuing no-debt statements; clearing book rental fines; elaborating catalog

cards; and assessing scientific databases.

Within the context of the services provided, we observed that sensory-disabled users were not covered, more specifically blind or low sight, deaf or hearing disabled, and deaf-blind users.

Therefore, the interest in this matter aims to contribute to the social and educational inclusion of disabled people, and to bring visibility to their rights for informational and communicational accessibility, as foreseen in art. 2º of Law 10.098 (2000). This law assures accessibility as a possibility and condition to the safe and autonomous use of spaces, furniture, urban equipment, buildings, transports, information and communication, including its systems and technologies, and other services and facilities, private or public, both in the urban and rural zones, by the person with disabilities or reduced mobility (Law 10.098/2000).

Against this background, we question whether the remote assistance provided by UFMA's University Library via the internet is accessible to users with sensorial disabilities, and propose to answer this question by carrying out a documentational research, evaluating the library's website through the organization *"Movimento web para todos"* (Web for all Movement), and directly observing the services provided by the library's website.

It should be highlighted that the university library's main role is to provide support for teaching, research and extension activities with the precision and speed required by academia. Thus, to meet its users' demands, the library needs to evolve together with the university, and contribute to making information increasingly democratic and to promoting social inclusion.

2. University library and full accessibility

The university library is a tertiary teaching institution that meets the information needs of university faculty, students, and staff, providing support to teaching, research and extension activities. It can be both a single library, or several ones organized as a system or network (Cunha & Cavalcanti, 2008). As a democratic, opinion-making and knowledge-producing space, it must guarantee that all its users have an access free of architectural, communicational, and behavioral barriers, aiming to break prejudices, segregation, and exclusion concepts.

In the library context, accessibility is a fundamental process to meet individual rights and to promote citizenship. Hence, it is necessary to identify and eliminate barriers that may prevent anyone from performing its social roles. The presence of disabled students in academia is a challenge to be faced by tertiary education institutions, and thus by libraries. Therefore, these must be reorganized to welcome, assist and provide these students with access to information, as well to create new services that are accessible to them.

> Therefore, it is up to the university library to provide, besides the accessibility and adaptation in the physical space, the promotion of information to members of the university community, including those with any kind of disability, without discrimination. Thus, it is important to meet the specific needs, by offering access to information in different ways, contributing to the intellectual development and citizenship. (Stroporo & Moreira, 2016, p.215).

Thus, focusing on the psychosocial dimension of accessibility in University Libraries means recognizing the role accessible structures play on the life of its users, both inside and outside university. This includes

feelings that may both strengthen or weaken the emotional structure of individuals, resulting in adequate or inadequate behaviors regarding their professional future. It is up to librarians to constantly search for inclusive practices on behalf of people with disabilities.

An accessible and inclusive library works beyond the perspective of access to the collection, but also the physical space itself within the organization, aiming to provide adequate assistance conditions. Therefore, these spaces and their staff should be valued. The librarian is the one who is mainly responsible for the library's quality, good service, and access to all its possible users.

Librarians' commitment to contributing to an inclusive society, consolidating the accessibility and inclusion of disabled students in university libraries can be achieved through actions such as: identifying weaknesses in the assistance to users with disabilities; proposing the acquisition of assistive technologies for informational accessibility; eliminating architectural/physical barriers that may hinder the movement of users with physical disabilities or low mobility, among others (Silva, Costa & Crivellari, 2014).

We highlight that, in 1931, the librarian and mathematician Ranganathan already cared about assisting any kind of user, as seen in his book "The Five Laws of of Library Science", in which he writes about the second law – "every reader his/her book" –, emphasizing that all individuals have equal rights to information access, i.e. the same opportunities, "[...] However, the Second Law will treat all as equal and offer to each its book. It will scrupulously obey to the principle of equality of opportunities regarding books, teaching, and entertainment". (Ranganathan, 2009, p.92).

In this perspective, we highlight the blind user, who relies on printed books being written in Braille in order to have access to them, in addition to the necessary information, so that they can access a library safely and autonomously. In this specific case, this includes tactile flooring, adapted computers, marked shelfs, etc.

Based on the discussed facts, it is up to university library staff to identify the needs and to guarantee that their products and services are aligned with their users, safeguarding the equal access to information and knowledge (Stroporo & Moreira, 2016). Librarians must know the singularities of each user to provide access to information in a precise and coherent manner. In this sense, we emphasize that making physical and virtual environments accessible is not enough. It is also necessary to provide information and knowledge that deconstruct unfavorable social behaviors regarding people with disabilities.

Social attitudes, such as pursuing good quality education for everyone, fighting against prejudice and stigmas, raising awareness about the role each individual has in society, and constantly debating about universal human rights are of great importance to the construction and strengthening of a fair and inclusive society, and of all of its citizens (Souza, 2013).

Aspects of full accessibility should be included in the planning of university libraries so that their services and products, as well as their physical and virtual spaces, are available and accessible to the human diversity, contributing to the consolidation of a society that respects each individual's specific needs.

3. **Communicational accessibility in the university library**: the inclusion of users with sensorial disability during the pandemic

At the beginning of 2020, society was surprised by a pandemic caused by Covid-2019, which determined social distancing measures and the restriction of everyday activities worldwide. In face of this new scenario,

the importance of access to information through virtual media was made even more evident and necessary to the safety, protection, care, and guarantee of life.

Information for all is a right envisaged by the Brazilian Federal Constitution of 1988, and it is fundamental for a democratic society. However, many people are still excluded from the communicational and informational process due to several barriers, among which are technological ones. For those with disabilities, the lack of and/or poor accessibility in communication and information hinders the access to goods and services everyone is entitled to.

To better approach the accessibility issue, we mention the Brazilian Law for Inclusion (LBI), Law no. 13.146 (2015) from July 6, which defines the six barriers faced by persons with disabilities in Brazil, namely: urban, architectural, in transports, in communication, in information, behavioral, and technological (BRASIL, 2015). Therefore, considering the university is a democratic, opinion-making and knowledge-producing space, it should contribute towards guaranteeing the rights of everyone with access to the institution, promoting full accessibility in academia.

In the university context, the library is mainly responsible for providing bibliographic, documentary and informational infrastructure to support academic activities, centering its objectives on the needs of its users by providing services, access to information, reading material, and other available resources, all of which are tools of society. It should support teaching, research, and extension programs, addressing the profile of each user and guaranteeing an accessible space. The library, as an inseparable part of the institution, must be seen as a diversity, equity and citizenship model.

In this sense, the library is an important ally for fighting the oppression and discrimination imposed by society, which insists on putting the person with disability aside. As highlighted by Moraes (2010), fighting this type of ideological domination in pursuit of social emancipation, and thinking of new ways to build existential territories where it is possible to undermine a certain ordainment – a principle of normalization, which makes the disability exist as a lack, failure, inefficiency – is indispensable to build a collective and plural society.

The impacts of the pandemic reinforce the need for continuous actions to promote, defend, and guarantee the rights of persons with disabilities, including the right for information. This is especially important, since the risk of contamination increases as a consequence of communication barriers, i.e., “the probability of someone being infected with Covid-19 increases three times due to lack of communication accessibility” (Gertner & Vasconcellos, 2020, p.21).

Therefore, information should be accessible and egalitarian, being a responsibility of the library to provide a physical and virtual space that can be explored by anyone, considering one’s specificities and the individualized pursuit of knowledge. Thus, the librarian needs to invest in inclusive practices on behalf of persons with disabilities. An accessible and inclusive library works beyond the perspective of access to the collection, but also makes all its services available in a democratic way. The librarian must show favorable behaviors in the context of social inclusion, aiming to provide good assistance, access to sociocultural knowledge and other services provided by the university library to all possible users.

Because of the pandemic, the on-site assistance at libraries was suspended, and these started to exclusively offer their services remotely. It should be noted that libraries must be prepared to offer the same level of quality in both digital and on-site access. In this sense, the library must be adequate to the needs of its

public, and not the opposite. This is valid for society as a whole, as well emphasized by Sassaki (2010):

> It is up to society to eliminate all architectural, programmatic, methodological, instrumental, communicational, and behavioral barriers so that disabled people may access services, places, information, and necessary goods for their personal, social, educational, and professional development. (p.45).

From this comes the need for the librarian to know its users' particularities and demands. Indeed, these may enable them to define goals and strategies to provide services and products as envisaged in the article no. 69 of the Brazilian Law for Inclusion, regarding the provision of correct and clear information on the different products and services offered by any communication means used, including in virtual environments, containing the correct specification on quantity, quality and characteristics.

Aiming to better understand users with sensorial disabilities at UFMA's university library, it is necessary to present some of their relevant characteristics for librarians to consider when providing services and products:

Information for blind, low-sight and/or monocular users are generally provided through the Braille writing system, audio description, screen reader software, and/or larger font sizes; deaf, hearing impaired and/or deaf-blind users access information through the Brazilian Sign Language (LIBRAS), lipreading, images, captions, and the Tadoma method.

This knowledge on sensorial disability may provide guidance for the librarian to provide a more accessible, humanized, and inclusive assistance to its users. Besides the general information on the types of disabilities, it is important for librarians to know each user's particularities, which can be obtained through conversations.

Planning is also fundamental for disabled users not to be excluded from the informational context during the pandemic. Adopting accessible digital tools must be considered before and after the return of on-site activities, as it provides the means of access and participation by expanding the accessibility resources linked to website and social media content in a safe manner.

4. UFMA's library website and the remote assistance to users with sensorial disability

The internet is currently one of the most commonly used tools by institutions for providing information and, in the scenario of suspended on-site activities as a social distancing measure, the use of digital platforms becomes an important and strategic way for the maintenance of their services. To preserve their mission, libraries intensified the provision of services and goods through digital media.

At UFMA's university library it was no different: from March 23rd 2020 on, activities started to be exclusively remote. Services included guidance on ABNT's standards, issuing no-debt statements, clearing library book rental fines, elaborating and issuing catalog cards through the official library's electronic mail, sharing information on the deadlines of rented information material through the library's website (https://portais.ufma.br/PortalUnidade/dib/), free access to legal and health platforms, tutorials on how to access scientific databases, besides charity campaigns to provide basic food baskets to people in vulnerable situations, and a virtual reading group promoted by the sectorial library of the Human Sciences Center.

We highlight the initiative of the Library Board (DIB) in creating a DIB/UFMA *Instagram* profile with the

objective of presenting users with essential research tips and promoting the access to the library's website. UFMA's library defines its expectation as offering a dynamic and modern assistance to its users, with a focus on accessibility and services that favor items such as agility and autonomy, offering self-service totems for title lends, returns and renovations, for example (Universidade Federal do Maranhão [UFMA], 2020a). Considering this, we contextualize the remote assistance and access to information by users with sensorial disabilities provided through the library's website. According to the Accessibility Board (DACE), there are 106 students with sensorial disabilities at UFMA, among which 77 belong to the visual disability category, and 29 to the hearing disability category.

Among the many obstacles, one of the most detrimental to disabled persons is related to the information access. Therefore, the current concern is guaranteeing accessibility principles, including in the digital media. An accessible internet is available to people regardless of their limitations and differences, in which digital technologies are means that make for a more inclusive society (Sousa, 2018).

Internet accessibility implies that websites and portals are planned so that all people can receive, understand, navigate, and interact effectively with all pages. When there are interface barriers, users may feel lost and unsatisfied, as if they are wasting time searching for the desired path and are, many times, unsuccessful in accessing information: "Without accessibility in the internet, people with disabilities and reduced mobility lose autonomy and must rely on other people's will to execute simple and essential tasks" (Movimento Web Para Todos, 2017, non-paginated).

Therefore, it is necessary to think about means that may contribute towards everyone having opportunities for accessing information, since when we understand what are the barriers hindering the disabled user's right to come and go, along with its pluralities, it is easier to put communication accessibility into practice. In this perspective, we requested an evaluation of UFMA's and UFMA's university library websites to the organization **Web Para Todos** with the objective of verifying which aspects need to be improved and, consequently, tackling access barriers faced by users with sensorial disabilities as seen in figure 1.

LIBRARY		UFMA	
Keyboard navigation	YES	Keyboard navigation	YES
Shortcut links	YES	Shortcut links	YES
Image descriptions	NO	Image descriptions	**NEEDS IMPROVEMENT**
Color contrast	YES	Color contrast	YES
Page language	YES	Page language	YES
Libras	**NEEDS IMPROVEMENT**	Libras	**NEEDS IMPROVEMENT**
Accessibility page	YES	Accessibility page	YES

Figure 1. Evaluation on the accessibility of UFMA's and its library's websites
Source: Sá (2020).

Figure 1 audio description: Rectangular-shaped image with four columns. In the upper region, there are

two horizontal red bars, inside of which are written, in white, the words “Library” and “UFMA”. Below the “Library” bar are two columns, the first with a white background and black font, and the second with a white font and green, red, and yellow backgrounds. The information in these two columns are as follows: keyboard navigation-yes, shortcut links-yes, image descriptions-yes, color contrast-yes, page language-yes, Libras-needs improvement, accessibility page- yes. Below the “UFMA” bar are two columns, the first with a white background and black font, and the second with a white font and green and yellow backgrounds. The information in these two columns are as follows: keyboard navigation-yes, shortcut links-yes, image descriptions-needs improvement, color-contrast-yes, page language-yes, Libras-needs improvement, accessibility page-yes.

Considering these data, we verified that the lack of communication through audio description and the LIBRAS are the main factors contributing to these websites not complying with the article no. 63 of the Brazilian Law for Inclusion demands, which deals with the obligation of accessibility in websites kept by companies located or with commercial representation in the country, or by government bodies, to be used by the disabled person, securing them access to the available information, according to the best accessibility practices and standards adopted internationally (Lei nº 13.146/2015).

Regarding the library, we found no image descriptions. Without this audio description, users with vision and other kinds of disabilities cannot conduct an efficient research on the library’s digital collection. According to Motta and Romeu Filho (2010), an audio description can be defined as:

> [...] a linguistic mediation activity, a mode of intersemiotic translation, which transforms the visual into verbal, uncovering bigger possibilities of access to culture and information, contributing to the social, cultural and educational inclusion. Besides visually impaired people, audio description also expands the understanding of people with intellectual disabilities, the elderly and the dyslexic. (p.36).

The library must guarantee the accessibility both in physical and digital spaces, with the objective of making its services and products available to all users while considering the characteristics of each so that the information can be transmitted in an accessible and democratic manner.

We understand that the information made available by the UFMA’s library website should be directed towards the entire public comprising the university context. In this specific case, users with visual disabilities, have no access opportunity due to the lack of image audio descriptions. We use the “tutorial on how to access scientific databases” in figure 2 as an example.

Figure 2. Tutorial on how to access scientific databases
Source: UFMA (2020b)

Figure 2 audio description: Rectangular-shaped image. On the left side over a red background the words "Access scientific databases from home" are written with a white-colored font and, below these, the words "click and see the remote access tutorial" are written with a yellow font. A bit further down a computer screen with a red and white background is shown. On the right side over a white background are the logos from UFMA and the Coordination for the Improvement of Higher Education Personnel (CAPES') portal.

The library must be careful when spreading information, as it is paramount that its services are offered in multiple formats to reach the entire public. The cliché "a picture is worth a thousand words" certainly meets the needs of many people, but it only guarantees information for all with an audio description. As explained by Sonza, Santarosa and Conforto (2008), in case it is necessary to provide image files in Portable Document Format (PDF), other formats should also be included, such as TXT and/or DOC, with all of the non-text content properly described/adapted. This enables the access with text browsers, besides the complete understanding of all elements present in the file by users with visual disabilities.

A reasonable initiative was the creation of an *Instagram* profile to support services developed by the library, enabling the optimization of important information as a basis for students learning. This is in agreement with Pereira, Borges, Batista and Teles (2019), who report that "social media may have important roles in the learning process" (p.17), and, once again, we notice the need for audio description in posts, the lack of which excludes users with visual disabilities from this informational context, as observed in figure 3.

Figure 3. UFMA's library Instagram profile
Source: Universidade Federal do Maranhão (2020c)

Figure 3 audio description: Square-shaped image. In the upper left corner, over a grey background written with a black font is "Today we have...". Right below it is a computer screen with the words "Normalization tips" written over it with a blue font. On the right side are the words: "same-author document citation and we don't know how to properly cite them in the text. So, we are going to help!" written in a black font. In the lower corner over a white background are the words "Ufma_dib. Follow our normalization tips".

Regarding deaf users, the evaluation is defined as "needs improvement" for the Libras communication. This was identified both at UFMA's and at the library's websites, indicating that communication barriers still exist. In this specific case, we mention: lag when opening the VLibras software; signs that do not represent Maranhão state's regionalisms, and fingerspelling words to which there are already signs, as demonstrated in figure 4 regarding the translation for the word "library":

Figure 4. Libras translation for the word "library"
Source: Universidade Federal do Maranhão (2020d)

Figure 4 audio description: Rectangular-shaped image. In the upper region, over the red background to the left, the letters "DIB" are written with a white font, and next to it is UFMA's logo. In the lower region, over a white background, there is a title written in red letters: "Education, work, dedication, merit and conquest". On the left side there is an avatar, and right above it the word "library" is written. Right below are two avatars signaling the word "library" in Libras.

For the deaf user, access to information and communication implies specificities that must be observed to guarantee their full participation in the library. In this sense, the Decree n° 5.626 (2005), of December 22nd, in item IV, emphasizes that:

> Federal teaching institutions, from basic to higher education, must provide its deaf students with Libras-Portuguese translators and interpreters in the classroom and other educational spaces, as well as equipment and technologies that enable the access to communication, information and education.

When the library provides information in several formats, user potential increases, turning it into an inclusive space that hosts and respects its public's diversity. This is exactly the objective: making knowledge accessible, broadened, and democratic.

The current social distancing scenario challenges librarians into thinking of practices that debunk the invisibility of the user with disabilities, since the access to information enables these users to break out of another type of distancing caused by prejudice and discrimination. As discussed by Santos (2020), the limitations imposed by society on people with disabilities make them feel like being in a permanent state of quarantine, that is, social distancing. Therefore, the university library considerably benefits people with disabilities by providing its services through an accessible website. Regarding people with sensorial disabilities, **Web for All**'s objectives are that:

People with low sight capacity, who may or may not use screen magnifier software, have no issues with contrast or with identifying and clicking hyperlinks, bars and buttons or with increasing font

sizes; blind people who use screen reader software may navigate easily through the website, fill out forms, activate buttons through keyboard commands and even access information available in images through audio description texts; **deaf or hearing impaired people may access information in audio or video with transcriptions, subtitles and translations in Libras.**

For the university library to become truly accessible, librarians must be motivated, involved in the inclusion process and, most of all, properly trained to deal with diversity, with the needs of its users with disabilities and thus contribute to these students' education.

Therefore, we present some recommendations that may guide librarians in the process of including users with sensorial disabilities: in-text hyperlinks must indicate the link's destination. We recommend avoiding expressions such as: "Click here", "Learn more", and "post". The instructions should be: "Access the website (website's name)" and "Learn more in the portal (portal's name)", since visually impaired people navigate through links only; all non-text digital content must contain a description of the image (photos, illustrations, tables, graphs, gifs); there is a simplified method that directs the audio description: shape + person + scenery + context + action; in the audio description, the information must be direct, and it is necessary to avoid redundancy (pleonasm) in the description such as "the photo illustrates"; adjectives representing judgements (pretty, ugly, good, bad, etc.) are not part of the description; video content must be accompanied by an audio description; all video content with spoken text must be followed by a subtitled version (for deaf people literate in Portuguese). Besides subtitles, it is essential that all content also includes a Libras window (preferentially with an interpreter-translator) for the non-oral deaf; audio content (e.g. podcasts) must be transcribed into text; texts should have a simpler structure, with short phrases and paragraphs, direct order, active voice, without figures of speech or unusual terms.

During quarantine, the virtual environment intensified the opportunity for "new learnings and reflections that lead us to rediscover new fragilities and our roles within a society" (Martins, 2020, p.251). The live streams and webinars carried out through social media and YouTube are digital platforms favoring the training of librarians by developing accessible behaviors in the library.

In this sense, we highlight the university library from the *Universidade Federal do Ceará* (UFC), which presented live streams of themes that contribute to the strengthening of a more democratic library through the YouTube channel "*Seção de Atendimento à Pessoa com Deficiência (Biblioteca de Ciências Humanas* (BCH) – UFC)". The librarian Clemilda Santos disseminated important information in the live streams, namely: "Audio description in mediating imagery information: the librarian's role", "Public accessibility policies for libraries", "Accessibility to information: account of experiences in UFC's library system", "Deaf art: multiple looks", and "Library in action during quarantine: resources and services for disabled students" (This and other live streams are available through the hyperlink: https://www.youtube.com/channel/UC-gmZZRqRWlXH2g1zT4GP5Q). As contextualized by Santos (2020), the pandemic and quarantine are revealing possible alternatives to societies, so that they may adapt to new ways of living.

5. Conclusions

The scenario of social and/or physical distancing may represent a definitive push for the university library

to be reshaped into a space where inequality and exclusion are not allowed. Users with sensorial disabilities cannot be cast aside in this moment that requires a fast response from the library in the sense of guaranteeing, with safety, the continuity of its activities.

Considering the motto "The university that we want", UFMA's library plays an important role in supporting teaching, research and extension activities through its collection and services. Therefore, full accessibility must be included in this perspective, aiming to eliminate barriers regarding informational access of disabled students in tertiary education.

Access to information is a social right envisaged by the constitution. Therefore, guaranteeing this right is related to the democratization of society, and to the exercise of citizenship (Martins, 2002). In this sense, UFMA's university library must create accessible services to users with sensorial disabilities, so that they can access all services provided.

Against this background, it is essential that UFMA's university library develops informational and communicational accessibility measures through services and products that include the informational specificities and necessities of users with disabilities. Therefore, digital and assistive technologies promote the autonomy of users with disabilities in the library's virtual spaces.

We expect that, based on the understanding that all persons are equal in their rights, and that society should be egalitarian, improvements should be pursed so that no one feels socially, educationally, and professionally excluded. Therefore, the library should be a space of inclusion, socialization, and knowledge, favoring the construction of a more righteous and fraternal society, compliant to human rights.

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Stencil control in the automatic insertion of a PIM Company.

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Abstract

The article evaluated the control of Stencil in the subprocess of Printing of the SMD line of a company located in the Industrial Pole of Manaus (PIM), to provide subsidies to develop a computerized system. With computerization, the focus of employees will be directed to the activities of production and quality of manufactured products, also, the collection of process data, done in real-time, will allow managers to better monitor and take actions in the process. To this end, a case study, bibliographic research of articles, dissertations, and theses involving the theme, and documentary research (forms, records, etc.) with the sectors involved were used. The descriptive statistics method was applied, quality tools were used, aimed at identifying and solving problems such as PDCA, Pareto, Ishikawa Diagram, flow chart, and 5W2H. A study of the activities related to the control of the Stencil was carried out, of the documentation used in the process, as well as of the factors and causes related to the effective Stencil control. Among the results, 24 causes affect the performance of the Stencil control, concluding that the main failures were human, due to the prioritization of production goals by the employees, leaving the other activities in the background, which is why the 24 guidelines proposed for the computerization of this process become relevant, some of which are: defining means to identify each Stencil using a bar code or QR code; do not allow the use of the Stencil if one of the activities unfinished in the process; stop production when an activity is not performed; digitize the documents used in this process; create an automatic notification to those responsible, when an action is necessary, etc.

Keywords: Automatic insertion; Stencil control; Quality tools

1. Introduction

This case study was carried out at Company X, installed since 1994 at the PIM (Industrial pole of Manaus) with 1,400 employees, of whom 1,260 (90%) work with the assembly of printed circuit boards for electronic products, such as microwaves, notebook chargers, voltage converters, remote controls and digital routers, a product line considered the organization's flagship (80% of its 2018 revenue).

Its manufacture has 20 lines of manual insertion (IM), 24 lines of automatic insertion of assembly (IA)

SMD (Surface Mount Devices), 12 automatic insertion machines PTH (Pin Through Hole), and a training area and a laboratory of trials.

This research focused on the automatic insertion (AI) process, specifically in the assembly of ultra miniaturized components for surface mounting (SMD), since the company has invested in the last 5 years to automate and computerize the production steps without yet completing the implementation at over time.

Some of the equipment (Figure 1) of an AI assembly production line are: 3 - Printer: applies solder paste or adhesive to plates; 4 - SPI (Solder Paste Inspection): inspects the solder paste or adhesive applied to the plate; 6 - Pick and Place - Chip Shooter: assembles smaller and simpler components (resistors, capacitors, etc.); 7 - Pick and Place - Fine Pitch: assembles larger components such as integrated circuits, connectors, shielding, etc. (SILVA, 2015).

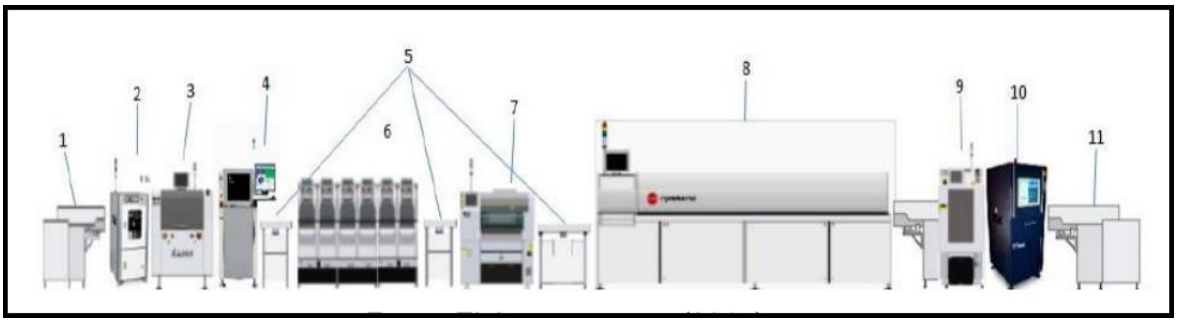
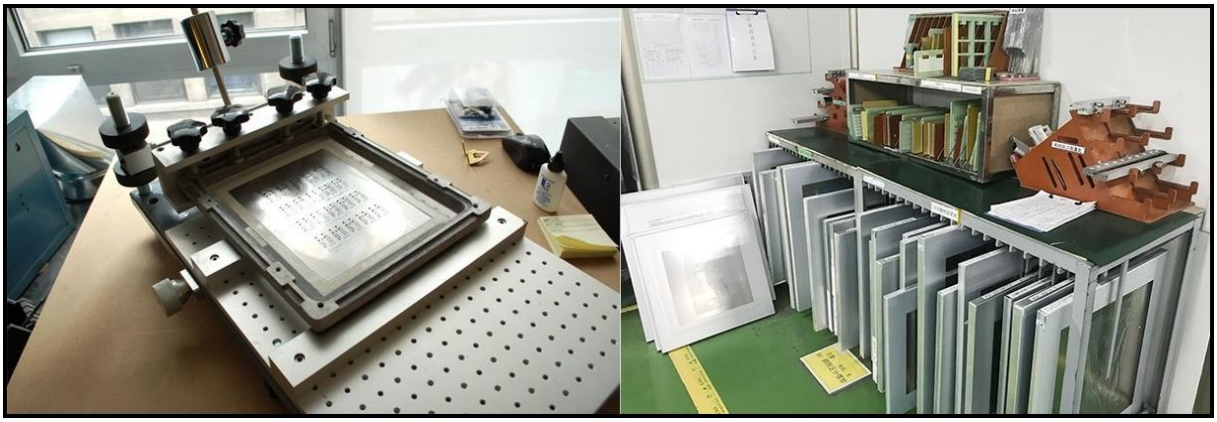


Figure 1: Standard line of automatic insertion

Source: Silva (2015)

Besides, Company X's SMD assembly line process can assemble 2.8 million components/hour and is comprised of the following sub-processes: Printing, Component Assembly, and Fusion.



Figures 2 and 3: Examples of Stencils

Source: Venture Electronics <https://www.venture-mfg.com/pcb-stencil/>

In printing, the solder paste is deposited utilizing the Printer (component 3 of Figure 1), in addition to a screen known as Stencil (Figures 2 and 3). Also, Stencil, solder paste, and Printer parameters are controlled, since they are essential to maintain the quality of manufactured plates.

The Stencil transfers a precise amount of solder paste in the correct positions of the Printed Circuit

Board (PCB) and its control is relevant, carried out through the assessment on the receipt; evaluation during the process; disposal assessment; proper handling; analysis of useful life; revalidation of useful life; cleaning; and also by measuring the surface tension at a predetermined frequency.

Concerning Component Assembly, this subprocess uses Pick and Place machines (equipment 6 and 7 in Figure 1) to assemble all electronic components on the plates, according to the product structure defined by engineering. Finally, Fusion is the sub-process that fuses the solder paste deposited on the plates, with mechanical fixation and electrical connection between the components.

At Company X, control of the Stencil has been carried out manually by employees and recorded on forms, causing numerous problems due to the omission of procedures and records due to operational failure, such as lost forms, wrong sums, no data entries, an entry in the wrong form, erasure of data, torn forms, among others.

The Company has invested in the computerization of production processes, including AI, to a) manage production information in real-time; b) improve traceability; c) issue notices and reports to improve the effectiveness of the actions; d) avoid failures; e) better meet customer requirements.

As a result, developers need information and experience from employees in the Production, Engineering, Information Technology, and Quality sectors so that they can deliver solutions that help reduce the number of problems detected in the Printing subprocess, the target of the research..

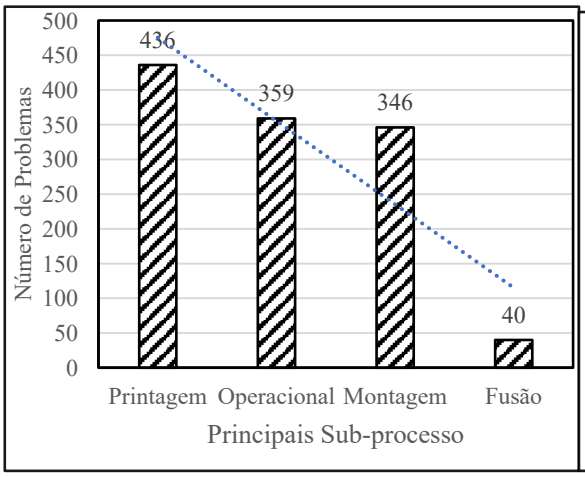


Figure 4: Number of defects in the sub-process

Source: Empresa X

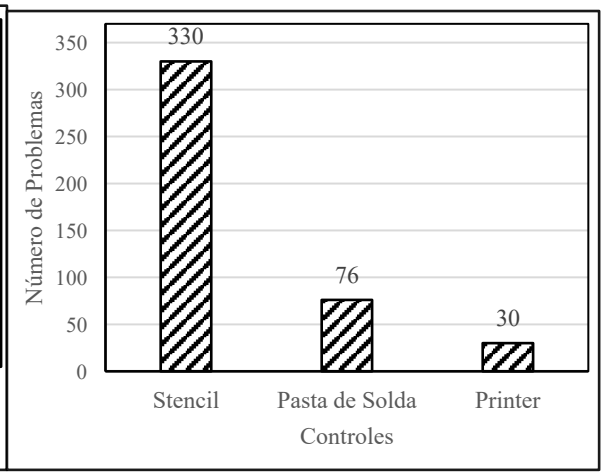


Figure 5: Number of defects in the Printing

Source: Empresa X

A study in the AI line process carried out between May and September 2019 (Figure 4) revealed that 1,181 defects (Número de Problemas) occurred, with the majority (436 occurrences or 36.92%) being in the Printing (Printagem) subprocess. After evaluating the defects presented in this subprocess, the majority (330 occurrences or 75.68%) of the problems are located in the control of the Stencil (Figure 5).

1.1 Question and Objectives

The question that motivated the research was "how to provide developers with useful information that contributes to the effectiveness of the computerization of the Stencil control?"

The general objective was to provide subsidies for the development of a computerized system for the

control of the Stencil in the subprocess of Printing of the SMD line of Company X.

The specific objectives were:

a) to map the main activities of the control of the Stencil;

b) map the instructions and documentation for the control of the Stencil;

c) identify the critical factors of a sub-printing process, aiming at an effective control of the stencil;

d) to identify the main problems existing in the control of the Stencil, as well as its causes;

e) propose guidelines to make the control of the Stencil more efficient, based on the computerization of this process.

1.2 Importance of research

In Brazil, this theme is in sub-area 1.3 (Maintenance Management) of the Industrial Operations and Processes Engineering area, linked to Industrial Engineering. Despite its relevance, there is some difficulty in finding articles in journals or similar events of Industrial Engineering in Brazil, as well as in some thesis database in the country (Table 1).

Table 1- Search for "Stencil Control in Automatic Insertion" in events/journals, and database of thesis on Industrial Eng.

SOURCES	QUANTITY	AUTHORS
ENEGEP Annals (1996 to 2018)	1	Conceição et al., (2009)
On Line Journal (ISSN16761901)	0	-
GEPROS Journal (ISSN19842430)	0	-
Management & Production Journal (ISSN0104530X)	0	-
Bank of Dissertations and Theses - USP	0	0
Bank of Dissertations and Theses - UFRJ	0	0
Bank of Dissertations and Theses - UFRS	0	0
Bank of Dissertations and Theses - UFPA	1	Uhlmann (2015)
Bank of Dissertations and Theses - UFAM	1	Bitar (2015)
Bank of Dissertations and Theses - UFSC	1	Doro (2004)
Total	4	-

Source: Author

A general search on the Internet found articles, dissertations, or theses, but mostly international, in English (FLECK, 2003; HUANG et al., 2011; TSAI, 2007; TSAI, 2008; KHADER; YOON; LI, 2017; ANGLIN, 2009; SEZGIN et al., 2017; HE; EKERE; CURRIE, 1998; BARAJAS et al., 2008); GOPAL et *al*., 2007). Thus, the study acquires more importance for Industrial Engineering, as it contributes to the academy to reflect on a little-explored theme in a region with an Industrial Pole with hundreds of companies that use automatic insertion in their manufacturing processes.

For Company X, it will be possible to broaden the view of the importance of the problem, since it is widely recognized that 60% of the welding defects that occur during the assembly of PCB, are associated with the Stencil Printing subprocess (TSAI, 2008; HE et al, 1998; PAN, 2001). Also, this study contributes to creating a culture of combating waste, since in automatic insertion lines about 40% of production time may be being wasted due to problems related to improper application of Printing (KHADER; YOON; LI,

2017). The research contributes to the preventive and evaluative process of the quality of the organization, as there is a study that points out that every dollar spent on prevention and quality assessment, one can earn 4 dollars in the reduction of internal and 32 external failures (HELDT, 1994).

The investigation of the Stencil control process, considering that information is the essence of Quality, brings valuable knowledge about the data collected during the manufacturing processes that are crucial for analyzing the problems and their possible causes (MOURA, 1996). So, knowing that the use of information is fundamental to obtain data in real-time, information technology proves to be a relevant tool for the organization to remain competitive in the market (FREITAS, 1997; STONER, 1999).

2. Theoretical Reference

2.1 SMT (Surface Mount Technology)

In the SMT, the electronics components are assembled on the surface of a PCB (Figure 6), while in the technology that preceded the SMT, known as PTH, the components are assembled through holes in the PCB (Figure 7).

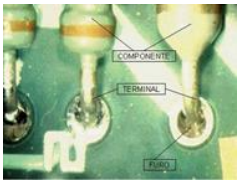


Figure 6: SMD Component

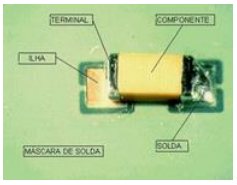


Figure 7: PTH Component

Source: DSTOOLS < https://dstools.com.br/introducao-a-tecnologia-smd/>

Moraes (2006) comments that the technological advances made possible the use of equipment, techniques, and products that influenced the automation of productive processes in the industries, making possible the progress in the levels of precision, flexibility, and capacity to perform large volumes of production. Fuse (2019), on the other hand, believes that in SMT, the components are welded on the surface of the plate, not requiring the plate to be perforated.

This technology emerged in the mid-1960s and is still evolving. Initially, the components were produced in packages similar to PTH components, where the terminals were cut and shaped to allow welding on the surface of the plate, with the width of the terminals and the geometry of the components being continuously reduced.

In SMT technology, Pick and Place component insertion machines (Chip Shooter and Fine Pitch) are used throughout the production process, from the application of the solder paste to the assembly of the components, and remelting of the solder paste. As the components in general, they are small, sensitive, and require an assembly precision, requiring strict control of the process parameters (MORAES, 2006).

Finally, it is worth noting that the manufacture of a PCB involves the selection of components, the layout of the board, and the manufacturing, assembly, and testing processes. During these steps, various defects can occur. Understanding the origin and consequences of defects is essential for corrective and preventive actions to be taken (DORO, 2004).

2.2 The printing

In this sub-process the solder paste or adhesive is deposited on the PCB, using the Printer.

A Stencil has also used that changes according to the product to be produced. To guarantee a good deposition of the solder paste, it is necessary to control some parameters of the Printer such as a) printing speed; b) squeegee pressure; c) Stencil separation distance from the printed circuit board; d) speed of separation of the Stencil and the printed circuit board; e) squeegee size; f) type of squeegee; g) cleaning frequency.

The parameters must be documented so that they can be checked by the machine operators before starting the production process. It is recommended that the parameters appear on the Quality Control (QC) checklist for verification at a specified periodicity and to ensure greater control of the process. Their change must be recorded in an action plan prepared by the team involved to standardize and disseminate learning and continuous process improvement.

2.3 Stencil

It is a metalized screen with openings (Figure 8) according to the PCB drawing (Figure 9), whose function is to ensure proper deposition in the solder paste on the printed circuit board, contributing to the quality of the components' weldability in the PCB.

Figure 8: Openings in *Stencil*

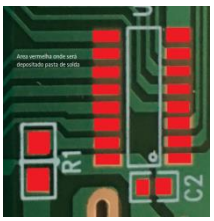


Figure 9: PCB without component-PAD'S.

Source: Author

In the making of the Stencil, the chemical machining, electroforming or laser process is used, and it is necessary to send the following information to the manufacturer: a) image photolith, or Gerber or PCB file without assembly; b) dimensional specifications of the pads/holes (if necessary); c) type of metal, thickness, and type of fiducial; d) dimensional of the Stencil and frame; e) relative position of the image on the Stencil; f) other complementary information.

To ensure the quality of the solder paste deposition and to control the Stencil during the PCB assembly process, the following activities are carried out: a) evaluate the received stencils; b) identify received Stencil; c) perform cleaning of the Stencil; d) control the amount of printing performed (useful life); e) revalidate Stencil when necessary; f) perform a surface tension test; g) discard Stencil with problems; h) evaluation of the Stencil during the process. These activities are recorded on forms by employees to improve process control and, through changes in control parameters, the results obtained for continuous process improvement can be evaluated.

2.4 Quality Tools

It is not news that much has been written about quality. For Juran, "Quality is the absence of defects",

it is "suitability for use". Crosby, on the other hand, believes that "Quality is the product's compliance with specifications". Deming says “Quality is everything that improves the product from the customer's point of view”. In Ishikawa's view, "Quality is developing, designing, producing and marketing a quality product that is economical, more useful and always satisfying to the customer". For Feigenbaum, “Quality is the correction of problems and their causes throughout the whole series of related factors such as marketing, projects, engineering, production, etc., which influence user satisfaction” (FREITAS, 2009).

Quality tools are means that define how to collect, analyze, and propose actions to improve processes (CAMPOS, 2013). To obtain better results, all employees of the organization must know and make use of the following basic quality tools: a) PDCA cycle; b) histogram; c) Pareto diagram; d) Ishikawa diagram; e) control chart; f) process flow chart; g) dispersion diagram; h) verification sheet; i) brainstorming, etc. For this article, only the PDCA Cycle, Pareto Diagram, Ishikawa Diagram, and Flowchart tools will be addressed, as they will be used in the study.

2.4.1 Organizational Learning Cycle PDCA (Plan, Do, Check e Action)

The PDCA cycle (Figure 10) is one of the most used and well-known management tools for improving processes and solving problems (WERKEMA, 1995).

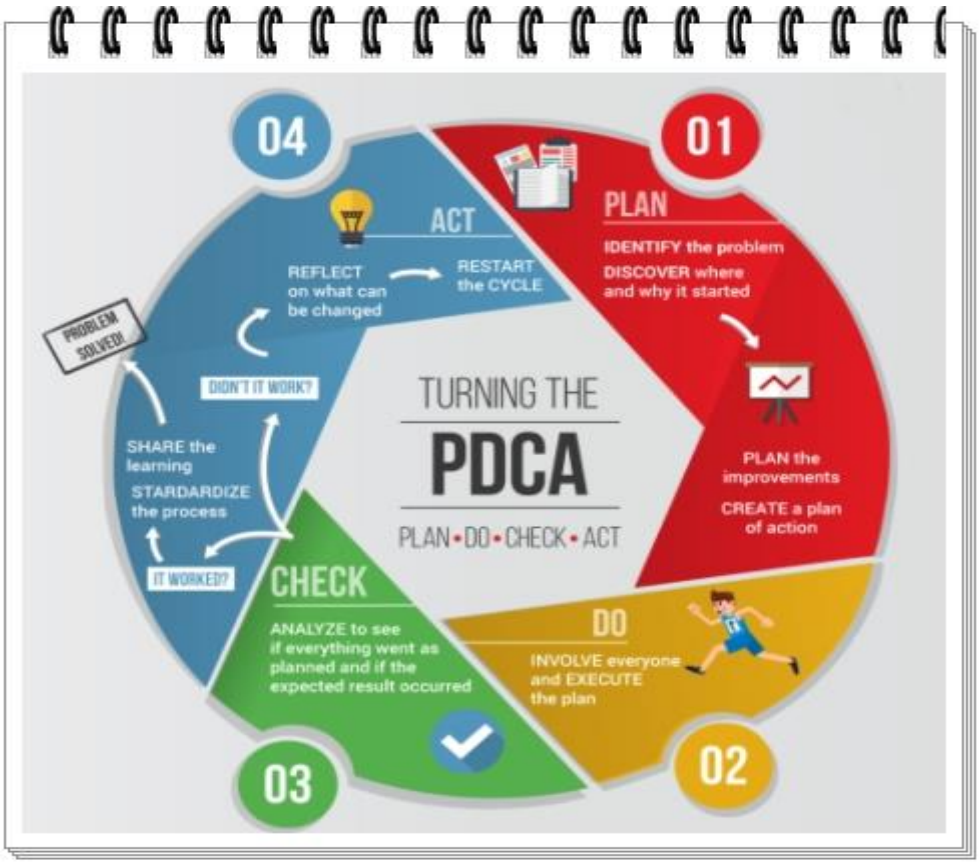


Figure 10: PDCA Cycle

Source: Siteware <https://www.siteware.com.br/en>

The first step is to plan, which consists of identifying the problem, finding out where and why it started, identifying and prioritizing solutions, as well as developing an action plan. The second step is to carry out

the actions, involving people, including the education and training process. The third step is to check the actions to verify that they were carried out as planned.

Finally, the fourth step is intended to act, which can take two forms:

a) the first is to standardize the actions that have had good results, as well as to disseminate them;

b) in case of errors or non-conformities, the action is to reflect on the causes of these errors and correct them through corrective actions, pointing out guidelines so that the problem does not recur.

2.4.2 Pareto Diagram

The Pareto Diagram identifies the factors responsible for most of the problems, facilitates the visualization and identification of the most relevant causes or problems, thus guiding organizations to focus their actions on the identified issues.

The Pareto Principle - also known as the 80/20 rule - follows the observations of economist Vilfredo Pareto, whose studies show that 80% of the land in Italy belonged to 20% of the population.

Juran realized that this same 80/20 rule could also be applied to quality issues: he coined the phrase “the vital few and the trivial many” to convey that a small percentage of main causes can result in a high percentage of problems or defects. ("History of Dr. Juran | Juran", [s.d.])

In Quality Control, Pareto identifies the factors responsible for the greatest effects in terms of tailings, scrap, or costs, and this information is used to drive process improvement.

Figure 11 shows the elements (Frequency, Causes, Accumulated frequency) of the diagram that allow identifying which are the most significant factors, indicating the items that should be prioritized, thus helping organizations to make decisions (MENDES, 2015).

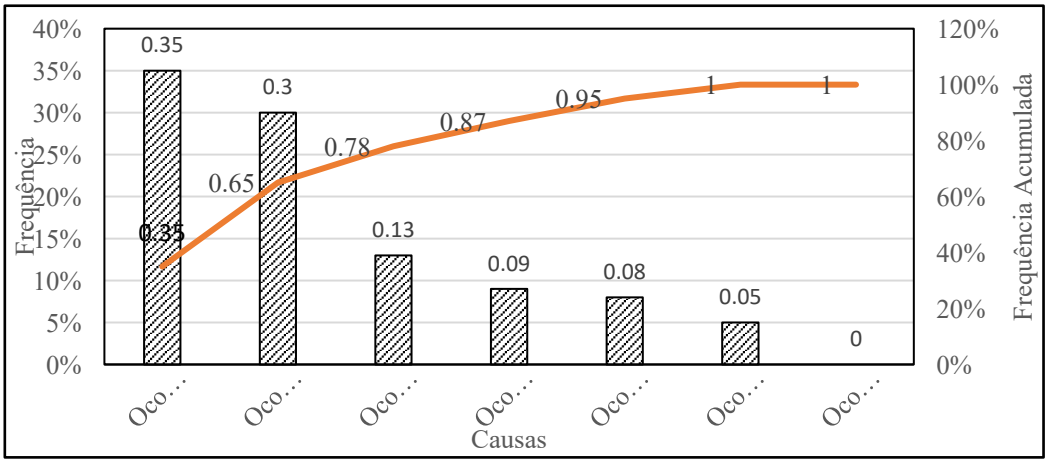


Figure 11: Pareto Diagram

Source: Author (2020)

2.4.3 Ishikawa Diagram

The Ishikawa or Fishbone Diagram (Figure 12) was created by chemical engineer Kaoru Ishikawa in the 1950s, when the Japanese industry flourished, with the help of not only local talents such as Ishikawa, Sakichi Toyoda, Taiichi Ohno, but also renowned American teachers, such as William Edwards Deming.

It is considered an effective tool to diagnose problems in organizations (LUCINDA, 2010), as it allows analyzing the primary and secondary causes of a given problem. Besides, it is possible to assess the effects of problems, act on the causes, and thus create ways to act effectively on them.

This diagram (Figure 12) is well known and it has three main parts:

Part 1 is the Effect (Efeito), which can be a Problem or a Solution of a process, system or event;

Part 2 is called category (Categoria) or factors divided in four to six parts such as Machine (Máquina), Man (Mão de Obra), Measures, Method (Método), Material, Environment (Meio Ambiente);

Part 3 is composed by the causes (causas).

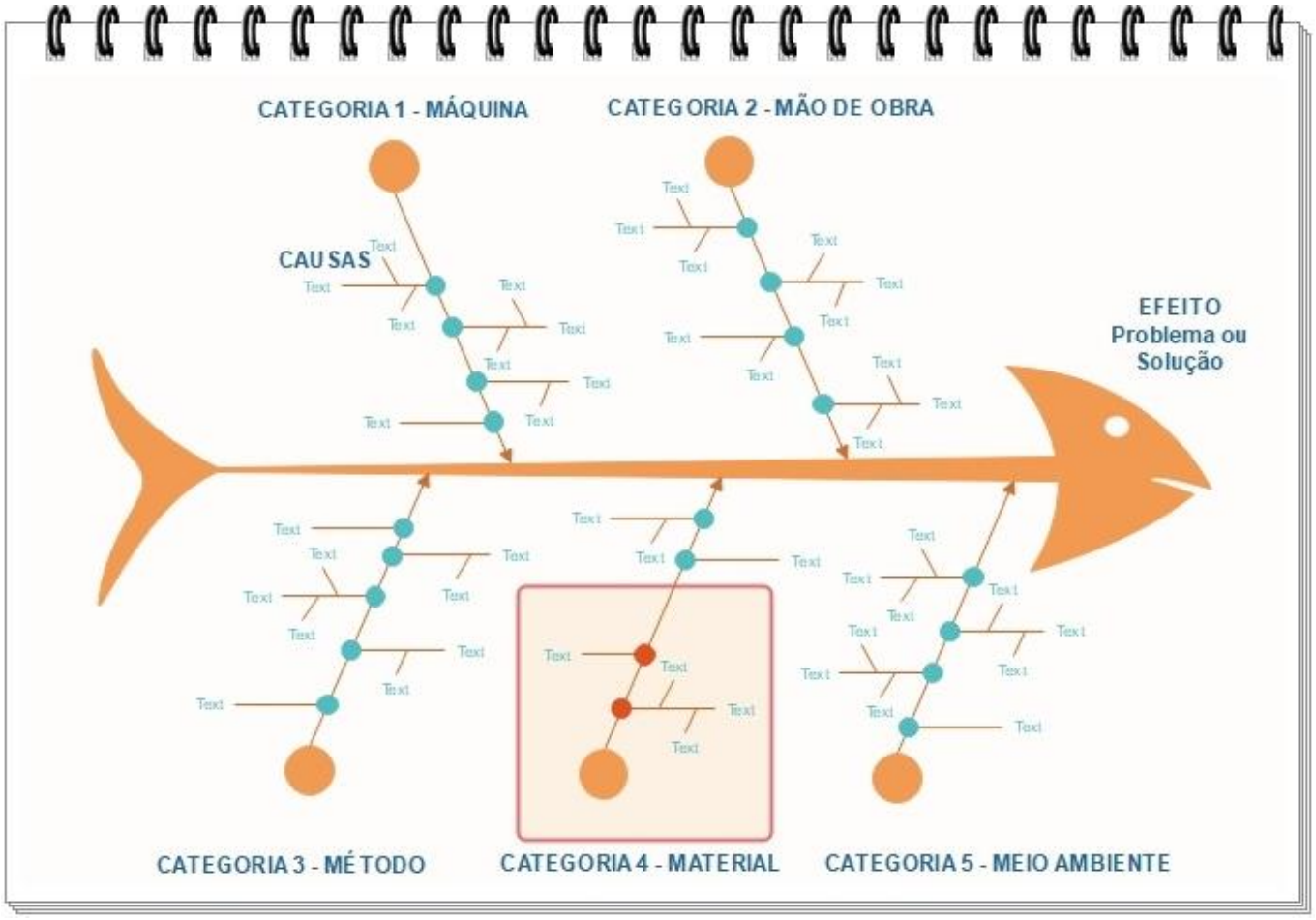


Figure 12: Three main elements (effect, categories, and causes) of the Ishikawa Diagram

Source: EdrawMax <https://www.edrawsoft.com/download-edrawmax.html>

Slack et al (2002) establishes four steps for drawing up the Ishikawa diagram: the first is to define the effect or problem; the second defines the categories of possible problems; the third seeks to identify possible causes for the problem; and finally, the main cause of the effect/problem is defined, as well as possible solutions.

2.4.4 Flowchart

The first flowchart was presented by Frank Gilbert to the American Society of Mechanical Engineers (ASME) in 1921 (SABINO, 2018). It is also called a procedure graph or process graph since it is a graphical representation of the sequence of steps in a process. This tool is used to carry out the documentation of activities, allowing you to easily understand how the process works.

It is a technique used to map processes, which consists of a universal graph that represents the flow of

activities carried out in a process.

This representation is made from geometric figures that symbolize the activities of the process and are linked by arrows that indicate the direction and the sequence to be followed.

Ishikawa (1915-1989), considered the flowchart one of the main quality control tools, along with other complementary tools, such as the histogram, verification sheet, and cause and effect diagram (SABINO, 2018).

The flowchart has the following advantages:

a) facilitates the understanding of the work process;

b) shows the necessary steps to carry out the work;

c) documents and standardizes the process;

d) demonstrates the sequence and interaction between activities/projects;

e) facilitates consultation in case of doubts about the process;

f) shows the responsibilities and relationships between stages and areas involved in the process;

g) it allows to identify bottlenecks, complexities, delays, inefficiencies, and waste;

h) improves the degree of analysis; among other advantages.

For Campos (2014) the flowchart is the initial step towards standardization and understanding the activities carried out in the processes, facilitating the visualization of manufactured products, customers and suppliers, operations, responsibilities, and critical points.

According to Barnes (1977), the flowchart indicates the various operations to be performed during the execution of a process, identifying activities of operation, transport, waiting, inspection, and documentation flow.

In the specialized literature, there are several flowchart models, but for this research, only the vertical flowchart will be addressed (Figure 13), as it is very useful to present the basic information of the sector or department, map processes, connect the symbols, as well as insert the execution time of each activity and the distance covered by the employees responsible for each activity.

For Kanawaty (1992), the vertical flowchart can be classified into three forms:

First) flow chart of the operator with an emphasis on recording the activities performed by the operator;

Second) material flowchart, whose objective is to focus on the material (raw material, parts, others), describing how it should be treated or handled;

Third) equipment flowchart, which records the method of using the equipment.

For Kanawaty (1992), the same form can be used for the three types of flowchart described, what changes is the emphasis given during the study.

Fluxograma Vertical do Processo

Código do fluxograma: 00025 **Página:** 01 de 01

Objeto de Estudo / Material / Produto: Pallets

Processo: Recebimento e Armazenagem de Pallets

Local: Armazém W-42

Método: (X) Presente ( ) Proposto

Formulado por: Rafael Lima **Data:** 19/03/2016

Aprovado por: João Silva **Data:** 23/03/2016

Atividade	Presente	Proposto	Economia
Operação	3		
Transporte	2		
Espera	1		
Inspeção	1		
Armazenagem	1		
Distância total (m)	420		
Tempo (min)	105		

	Descrição	Distância (metros)	Tempo (min)	Tipo de Atividade	Observações
1	Caminhão estaciona na doca de descarregamento	-	5		
2	Descarregamento dos pallets para a área "Transit"	100	12		Caminhão médio com 10 pallets
3	Conferência do material recebido com NF e *packing list*	-	10		
4	Impressão do relatório de recebimento	20	22		
5	Levar relatório ao motorista e liberar caminhão	10	1		
6	Cadastro dos pallets no sistema e colocação de *tag* RFID	10	22		
7	Empilhadeira armazena pallets nos porta-pallets	250	30		Distância média de 25m por pallet
8	Registro do endereço onde os pallets foram colocados	30	3		

Figure 13: Flow of Receipt and Storage of Pallets.

Source: Aprendendo Gestão <https://bit.ly/2Q2Cxii>

3. Methodology

The research is applied to Industrial Engineering and as for the objectives it is descriptive since it will describe the characteristics of the processes, the parameters, and main problems existing in the deposition of solder paste in the automatic insertion of the organization, without interfering in the studied variables.

For its development, there will be a combination of specific case studies and bibliographic research (articles, dissertations, and theses involving the theme). Also, this study is based on documentary research (records, forms, etc.) with the sectors involved, in addition to the application of quality tools aimed at identifying and solving problems.

The main stages of the research were: 1) map the main activities of the Stencil control to identify each activity, observing the procedures, forms, records, and other documents necessary to execute them; 2) identify the critical factors of quality printing and the effective control of the Stencil to define the critical

factors of the process and its efficiency; 3) to identify the three main problems that exist in the control of the Stencil, as well as their causes through the use of some quality tools; 4) develop guidelines to make Stencil control more efficient, based on the computerization of this process.

4. Discussion

4.1 Mapping of the main activities of the Stencil control

The mapping of the main activities of the automatic insertion Stencil control took place at the beginning of December 2019. For that, a chronoanalysis and a vertical flowchart were used.

In this process there are two types of Stencil control, one process is used when the Stencil is new and the other process is called control when the Stencil is used in the process.

For the case of the control of the new Stencil, Figure 14 shows fourteen activities that require about 1h42min22s to be performed when passing through three sectors.

Fluxograma Vertical						Tempo Processo (horas):	1:42:22
Símbolos	Operação	Total	2	00:05:55	5,78%	Empresa:	Empresa X
	Transferência de Material		5	00:07:40	7,49%	Tipo de Processo:	Padrão / Novo
	Decisão ou Medida		1	1:20:00	78,15%	Nome Processo:	Recebimento Stencil
	Documentação		5	00:08:02	7,85%	Setor:	Inserção Automática
	Armazenagem		1	00:00:45	0,73%	Data:	2/12/2019

Fase	Símbolos	X Tempo	Acumulado	% Acum.	Descrição
1		00:01:20	00:01:20	1,30%	Coordenador : receber novo Stencil do Almoxarifado.
2		00:01:45	00:03:05	3,01%	Coordenador : enviar e-mail para as áreas técnica e administração informando o recebimento do stencil .
3		00:02:25	00:05:30	5,37%	Coordenador : encaminhar o Stencil para o setor administrativo para realizar a sua identificação e registro.
4		00:05:25	00:10:55	10,66%	Administrativo :imprimir etiqueta de identificação do Stencil.
5		00:00:30	00:11:25	11,15%	Administrativo : fixar a etiqueta no Stencil.
6		00:01:25	00:12:50	14,08%	Administrativo : registar na planilha de controle de Stencil.
7		00:01:35	00:14:25	14,08%	Administrativo :encaminhar para avaliação da área técnica.
8		01:20:00	01:34:25	92,23%	Área Técnica : realizar a avaliação do stencil.
9		00:01:43	01:36:08	93,91%	Area Técnica : enviar e-mail para a coordenação e administração informando o resultado da avaliação.
10		00:00:45	01:36:53	94,64%	Área Técnica : enviar o Stencil para a área administrativa .
11		00:01:25	01:38:18	96,03%	Administrativo : registar na planilha de controle de Stencil o resultado da avaliação.
12		00:00:45	01:39:03	96,76%	Administrativo : disponibilizar o Stencil aprovado para Produção, a fim de ser armazenado.
13		00:01:35	01:40:38	98,31%	Administrativo : enviar o Stencil reprovado para o descarte.
14		00:01:44	01:42:22	100,00%	Coordenação: solicitar substituição Stencil reprovado

Figure 14: Control Receipt of stencil at Company X

Source: Author

The number of activities performed to obtain control of the Stencil was:

a) two activities (14%) related to the operation, which takes 5min55s to be executed, representing about

6% of the total activity time;

b) five activities (36%) related to material transfer, which takes about 7min40s to be carried out, representing about 7.5% of the total time required for the activities;

c) an activity (7%) related to the decision or measurement, but which consumed 1h20min, representing 78.15% of the total activity time;

d) five activities (36%) related to documentation, which consumed 8min2s to be performed, representing about 8% of the total time of activities;

e) an activity (7%) related to storage, which takes only 45s (0.35% of the total time).

For the case of the control of the Stencil used, Figure 15 (Appendix A) shows 29 activities with 42 min 44s to be performed by the operator, as well as by employees in the technical and administrative area. The number of activities performed to obtain control of the Stencil used was:

a) seven (24%) activities related to the operation, which take 23min27s to be carried out, consuming a little more than half (55%) of the total time of the activities;

b) four (14%) related to material transfer, which takes about 4min13s to be executed, representing 9.87% of the total time required for the activities;

c) seven (24%) related to the decision or measurement, but which consume 4min45s, representing 11.12% of the total activity time;

d) ten (34%) activities related to documentation, which consume 9min44s to be performed, representing almost 23% of the total activity time;

e) one (3.4%) related to storage, which takes only 35 seconds to execute.

4.2 Mapping of Stencil control instructions and documentation

Eight work instructions and nine forms necessary to carry out the Stencil control were identified. Table 4 shows the activities with their respective work instructions and forms, identifying the need to make improvements in 75% of the documents, as well as the preparation of a new instruction.

Table 4 – Table of activities indicating the Instructions and the number of forms for the Stencil control

Activity	Instruction	Sector	Number of Forms	Other types	Needs Change
Receive *Stencil*	IT XX.0001	Coordenation	0	E-mail	Yes
Identify and register	IT XX.0002	Administrative	1	-	Yes
Evaluate New *Stencil*	IT XX.0003	Technical	0	E-mail	Yes
Make Available for Production	IT XX.0004	Administrative	1	-	Yes
Evaluate *Stencil* Process	IT XX.0005	Productive	1	-	No
Clean the *Stencil*	IT XX.0006	Productive	2	-	Yes
Control the life of the *Stencil*	IT XX.0007	Productive	2	-	Yes
Measure voltage	IT XX.0008	Technical	2	-	No
Revalidate service life	None	Technical	0	E-mail	-

Source: Author

4.3 Critical factors of quality printing and effective Stencil control

4.3.1 Factors that influence good printing

The authors, Fleck and Chouta (2003 p. 25), argue that the design of the Stencil is one of the most important factors that determine a functional production in an electronic assembly plant.

This development depends on several factors such as the layout of the PCB, the materials, the components used, etc.

Fleck and Chouta (2003 p. 25) created a diagram (Figure 16) that identified four categories and several causes that influence quality printing.

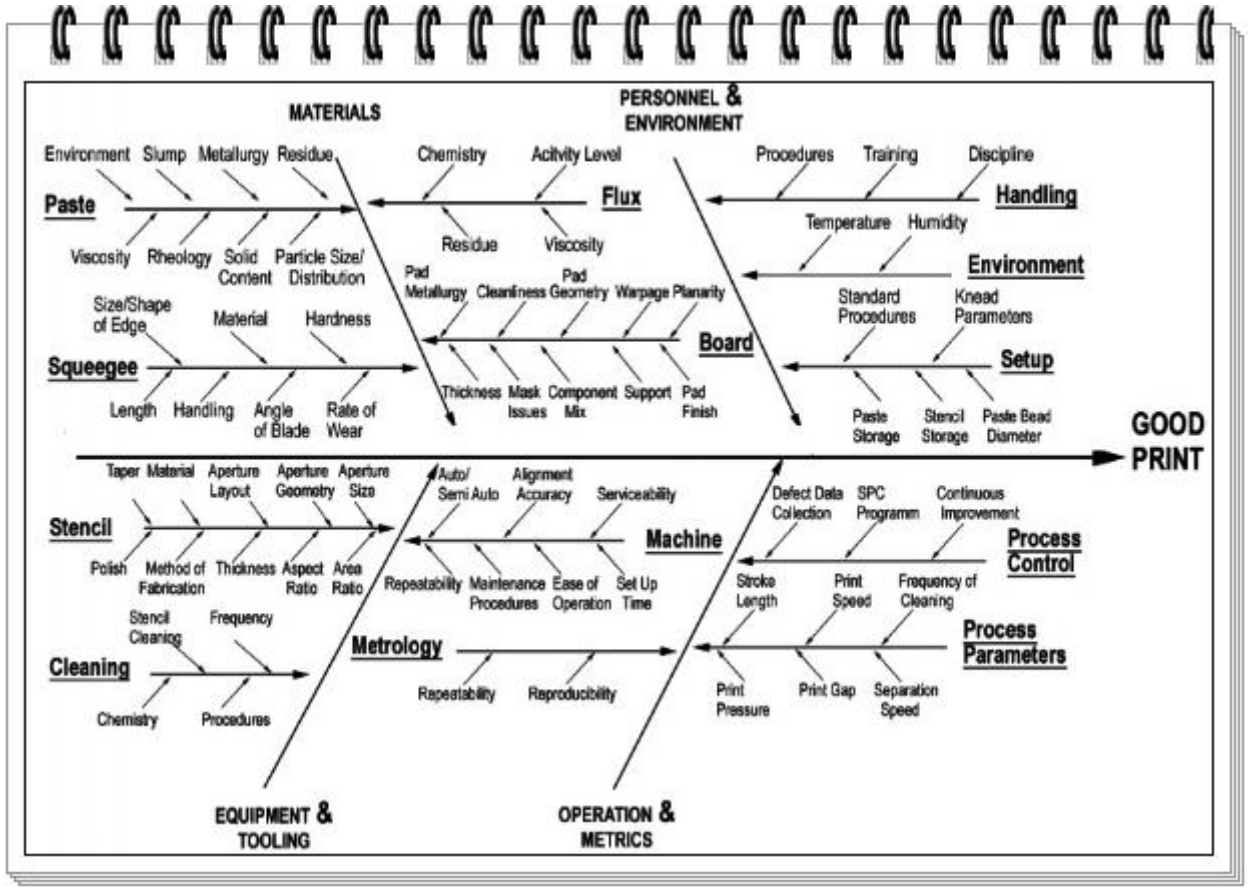


Figure 16: Categories that influence Quality printing

Source: Fleck and Chouta (2003 p. 25)

Altogether there are about 71 causes that contribute to an effective Printing, most of which are in the Materials category with 29 causes (40.8%), followed by Equipment and Tools with 21 causes (29.6%), ten of which are linked only to Stencil. Then come the category Operation and Metrics with 11 causes (15.49%) and the category Personal and Environment with 10 causes (14%).

4.3.2 Factors that influence Good Stencil Control at Company X

A survey was carried out in early December 2019 with the team that controls Stencil at Company X, to identify the main factors that contribute to this service being considered good. As a result, Figure 17 shows about twenty-four causes that need to be monitored by the process team.

The effect hoped is The Good Control of Stencil (Bom controle do Stencil) and the analysis shows that:

a) most of the causes are in the Method (Método) category (Figure 17) with ten (41.66%) that involve everything from the handling, correct identification of the Stencil, the disposal process, the existence of documented procedures, to methods to evaluate the process and the new Stencil, etc.

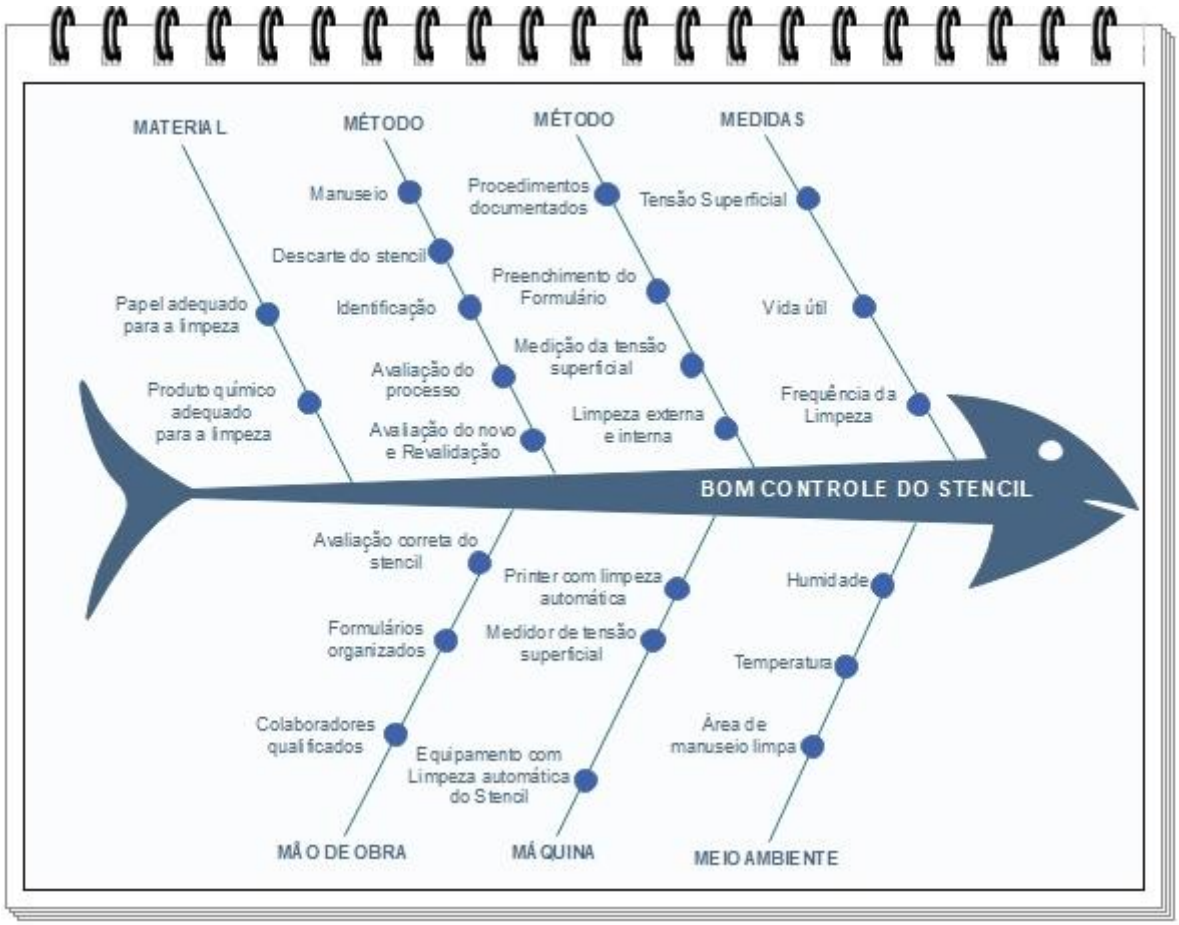


Figure 17: Categories and causes that contribute to a good control of the Stencil at Company X

Source: Author

The three causes (12.50%) in the Measures (Medidas) category are surface tension, lifespan, and cleaning frequency, whereas, in the Environment (Meio Ambiente) category, humidity, temperature, and cleaning of the handling area are another 3 causes considered relevant (12.5%).

In terms of the Machine (Máquina) category, another 3 causes were considered crucial were the automation of cleaning the Printer and the Stencil, as well as the superficial tension meter.

For the Man (Mão de Obra) category, good printing requires qualified, organized personnel with the capacity to make the correct evaluation of the Stencil.

Finally, the Category with the fewest causes (2; 8.33%) is Material, focused on paper and chemical products suitable for cleaning the Stencil.

To ensure repeatability in the process, it is essential that all methods implemented are properly documented and employees are properly qualified.

Any changes made to the processes must be reviewed and the impacts of these changes on the quality of the product must be evaluated by specific procedures and trained employees.

In this way, a record of the history of problems and, consequently, the actions are taken to solve them are kept, which allows employees to prevent routine problems.

4.3.3 Main problems with Stencil control and solutions

A study carried out between May and September 2019, involving 37 Stencils in each of the nine activities performed (Table 4), revealed (Figure 18) that most of the failures occurred (Quantidade de Falhas) in the activities of evaluating new stencil (Avaliação Novo=37), measuring surface tension (Tesão Superficial=37), in lifespan (Vida útil=37), and revalidation (Revalidação=37).

The evaluation activities of the new stencil, measurement of surface tension, and revalidation are performed by the Technical Area of Automatic Insertion. While the identification activities are carried out by the administrative area of production and the others are carried out by the machine operators.

Regarding the new Stencil Assessment activity, no records of the verifications carried out were evidenced, but after informal conversations carried out by those responsible for these assessments, it was found that all those responsible were trained to carry out this activity, and the inspections were, in fact, carried out, but there was a failure in its documentation.

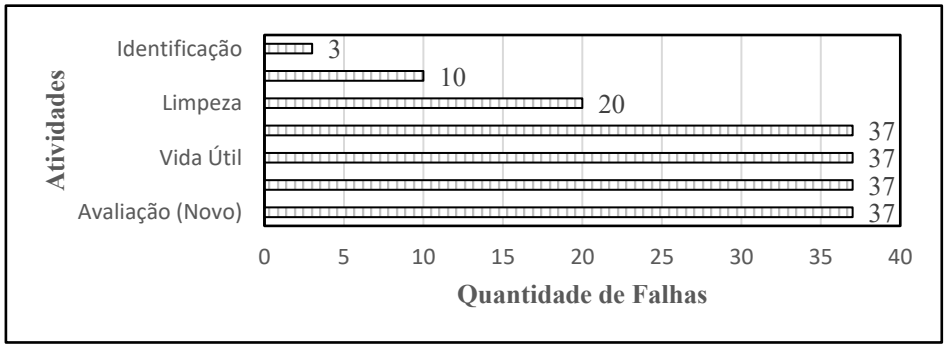


Figure 18: Number of failures in Stencil control activities

Source: Author

It was also found that in the Stencil Assessment instruction there is no form or checklist to be completed during the performance of this activity. Also, it was evident that no documented process identifies whether the Stencil was evaluated before being released for production, this can cause production stops since the stencil may contain flaws in the manufacturing process.

In the instruction of the surface tension measurement activity, there is a form defining, a methodology and parameters to be used in the measurement. However, in the 37 Stencils evaluated, the measurements were not evidenced. In informal conversations with those responsible, they informed that they were trained, but did not measure surface tension.

In the activity of the Stencil's useful life, the records of the 37 Stencils were evaluated and the following flaws were detected:

a) no Stencil identification information;

b) failure to complete the number of cycles performed on certain days;

c) wrong sums;

d) The stencils were not sent for revalidation by the technical area;

e) lack of records or records not found.

In conversations with employees, they reported that they were trained for the Stencil's useful life activity, but have difficulty doing it, as they are focused on achieving productivity goals. Besides, 19 lines (79.17%) are operated by only one operator, which makes Stencil control activities even more difficult.

The revalidation activity is directly related to useful life activity. After the Stencil completes its useful life, the machine operator must send it to the Technical Area for revalidation. And as there was a failure in the activity of controlling the life of the Stencil, consequently, the revalidation activity was not performed.

The results recorded in Figure 19 show that the main failures that occurred in the control activities of the Stencil were human:

a) unfilled form (formulário não preenchido=74); b) activity not performed (atividade não realizada = 37); c) failure to register the activity (não registrada a atividade=30); d) empty form fields (campos do formulário não preenchidos=20).

In informal conversations with employees, it was revealed that they prioritize achieving production goals, leaving other activities in the background.

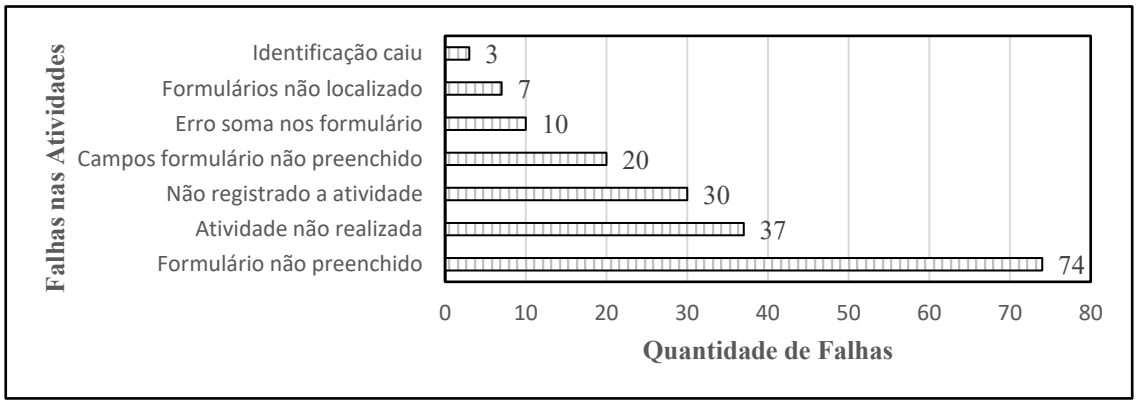


Figure 19: Number of failures (quantidade de falhas) in Stencil control activities

Source: Author

4.3.4 Guidelines for the computerized system to make Stencil control effective.

The guidelines were organized into two groups, the first contains general guidelines for the system and the second contains guidelines for effective stencil control.

The guidelines were developed in the first two months of 2020, based on the flaws detected in this research, in meetings with AI Leaders and Supervisors, as well as in documentary research in the process audit reports issued by customers and by quality control, it is worth mentioning that during system implementation, new needs may arise.

The system to be developed should provide the control of all activities inherent to the control of the Stencil and eliminate the activities of filling out forms by employees, thus freeing them for related activities.

To minimize the costs of implementing the system, hardware already existing at Company X should be used, as well as using the existing production monitoring system to collect data and use the funds

earmarked for research and development (R&D), which are governed by information technology law in the Amazon (Law No. 8387 of 12/30/1991).

4.3.4.1 General guidelines for the system

a) define means to identify each Stencil using a bar code or QR code;
b) define means to identify production lines and sectors in the AI production area;
c) create a user profile to perform Stencil control activities;
d) create an automatic notice to those responsible when an action is necessary;
e) not allowing the use of the stencil if one of the activities has not been completed;
f) develop a traceability mechanism to locate the Stencil;
g) create control of the quantity of Stencil requested per project;
h) control Stencil of third parties (customers);
i) have a database with a history of the improvements implemented in each Stencil;
j) be able to register the equipment used to control the Stencil;
k) not allowing the use of equipment that is out of calibration;
l) register the parameters used in the process;
m) be able to record problems and actions taken in the process;
n) be able to register qualified employees;
o) be able to register materials qualified for use in the process;
p) stop production when an activity is not performed;
q) eliminate printed instructions, using only a digital document.

4.3.4.2 Guidelines for Stencil Control

In the control of the stencil (Figure 17) there are about twenty-four causes that must be observed for the service to be performed correctly, so it is recommended:

a) digitize the documents of this process, as described in Table 4;
b) digitize stages of each of the activities involved in this process;
c) create a database that allows managing the parameters involved in this process, as well as preparing reports with indicators over time, involving the monitoring of the causes considered crucial pointed out in Figure 19;
d) develop an alert system to prevent errors or inform those involved in any abnormality in the process;
e) create alerts on the disposal of the stencil, informing the reason for the disposal, maintaining the history, which can be used to generate action plans;
f) inform if the equipment used needs calibration before being used in the process;
g) develop a robust label to be attached to the Stencil, to prevent it from falling.

5. Conclusions and recommendations

The general objective of the article is to provide subsidies for the development of a computerized system for the control of the Stencil in the Printing process sub-process of the SMD line of Company X.

From the analysis of articles, documents, and data, the following conclusions were reached:

a) the best way found at Company X to provide developers with useful information that contributes to the effectiveness of the computerization of the stencil control involves mapping activities, studying the documents involved in the processes, identifying the main problems, conducting meetings with those responsible to analyze the causes, propose solutions, as well as the guidelines;

b) nine activities were identified to carry out effective Stencil control at Company X: 1) receive Stencil; 2) identify and register; 3) evaluate new Stencil; 4) make available for production; 5) evaluate Stencil in the process; 6) clean Stencil; 7) control the life of the Stencil; 8) measure surface tension; and 9) revalidate the Stencil's useful life;

c) at Company X, the control of the Stencil is done using eight work instructions, nine forms, and there is a need to create a procedure for the activity of revalidating the life of the stencil. It is recommended that all instructions and forms are computerized, and it is also necessary to include new instructions and forms to c1) control the Stencil of third parties; c2) the control of the amount of Stencil used in a given product; c3) control of equipment used in the control, among others;

d) the research found 4 categories and 71 potential causes that guarantee good results in the Printing subprocess, with the majority being in the Materials category with 29 (40.8%) causes, followed by Equipment and Tools with 21 causes (29, 6%), ten of which are connected only to the Stencil. Next comes the Operation and Metrics category with 11 causes (15.49%) and the Personal and Environment category with 10 causes (14%). At Company X, new research can be carried out to deepen the study of causes that are not linked to the Stencil, to improve printing over time;

e) at Company X, 24 causes affected the performance of the Stencil control, and it was observed that the main failures that occurred were human: form not filled out, an activity not performed, an activity not recorded, empty fields. Informal meetings with employees revealed that they prioritize achieving production goals leaving other activities in the background, which is why the guidelines for the computerization of this process become relevant;

f) for computerization developers, 24 guidelines were proposed, the main ones being: defining means to identify each Stencil using bar code or QR code; do not allow the use of the Stencil if one of the activities has not been completed in the process; stop production when an activity is not performed; digitize the documents used in this process; create an automatic notice to those responsible when action is needed. New research can be carried out to measure the impact of adopting the suggested guidelines on costs, productivity, and quality improvement over time, such as, for example, a year with the new system compared to the previous year's indicators without the system. Another recommendation is to identify new bottlenecks in the processes and find ways to insert techniques or technologies from Industry 4.0 to improve the performance of Company X, as the Industrial 4.0 revolution is a solution adapted to face the scarcity of resources, inefficiency of processes, and reduction of waste.

7. Acknowledgments

Thank to Company X for the opportunity to conduct the research. To Doctors Marly Guimarães Fernandes Costa and Dalton Chaves Vilela Júnior, for coordinating the Postgraduate course in Engineering

and Industrial Management;

Thank to the supervisor, Prof. Dr. Jonas Gomes da Silva, for the support, encouragement and corrections;

Thank to Doctors Marcelo Albuquerque de Oliveira and Ocileide Custódio da Silva for the recommendations for improvements during the defense of the article on the board held in February 2020.

Finally, as provided for in Article 48 of Decree No. 6,008/2006, this work was financed by Flex Industries, under the terms of Federal Law No. 8,387/1991, within the scope of the Priority Project for Human Resources - CAPDA/SUFRAMA, coordinated by the Muraki Foundation and executed by the Center for Electronic Technology and Information CETELI of the Federal University of Amazonas - UFAM.

8. Appendix A

Fluxograma Vertical						Tempo Processo (horas):	0:42:44
Símbolos	Operação	Total	7	00:23:27	54,88%	Empresa:	Empresa X
	Tranferência Material		4	00:04:13	9,87%	Tipo de Processo:	Padrão / Novo
	Decisão ou Medida		7	0:04:45	11,12%	Nome Processo:	Controle Stencil no Processo
	Documentação		10	00:09:44	22,78%	Setor:	Inserção Automática
	Armazenagem		1	00:00:35	1,37%	Data:	02/12/2019

Fase	Símbolos	X Tempo	Acum.	% Acum.	Descrição
1		00:02:20	00:02:20	5,46%	Operador de máquina: localizar stencil para realizar set-up da linha conforme plano de produção.
2		00:00:40	00:03:00	7,02%	Operador de máquina: registrar a transferência de local do Stencil no Formulário.
3		00:01:25	00:04:25	10,34%	Operador de máquina: avaliar o Stencil (Limpo/ Danificado...).
4		00:00:30	00:04:55	11,51%	Operador de máquina: registrar a avaliação no Relatório de Produção.
5		00:01:00	00:05:55	13,85%	Operador de máquina: caso haja problema informar a Coordenação.
6		00:01:10	00:07:05	16,97%	Operador de máquina: localizar o formulário de controle da vida útil do stencil .
7		00:00:10	00:07:15	16,97%	Operador de máquina: verificar se o formulário corresponde ao stencil.
8		00:00:05	00:07:20	17,16%	Operador de máquina: avaliar se vida útil esta dentro da validade (número de ciclos na printagem).
9		00:00:30	00:07:50	18,33%	Operador de máquina: registrar no Relatório de Produção o resultado da avaliação.
10		00:00:20	00:08:10	19,11%	Operador de Maquina : Dar inicio a produção
11		00:15:00	00:23:10	54,21%	Operador de Maquina : Realizar limpeza do stencil conforme periodicidade definida na folha de set-up.
12		00:01:25	00:24:35	57,53%	Operador de Maquina : Avaliar as condições do stencil após limpeza.
13		00:00:30	00:25:05	58,70%	Operador de Maquina : Registrar no Relatório de Produção o resultado da avaliação.
14		00:00:02	00:25:07	58,78%	Operador de Maquina : Realizar controle vida útil do stencil.
15		00:00:30	00:25:37	59,95%	Operador de Maquina :Registrar no Formulário quantidade de ciclos realizados com stencil no final do turno de trabalho.
16		00:00:35	00:26:12	61,31%	Operador de Maquina : Avaliar se stencil necessita ser enviado para teste de tensão superficial, conforme números de ciclos
17		00:01:00	00:27:12	63,65%	Operador de Maquina : Enviar para a área técnica o stencil para teste tensão superficial.
18		00:03:25	00:30:37	71,65%	Área Técnica : Realizar teste tensão superficial.
19		00:00:30	00:31:07	72,82%	Área Técnica : Registar medição no formulário.
20		00:01:44	00:32:51	76,87%	Área Técnica : Caso medições estejam fora do especificado enviar e-mail informando a Coordenação e Administrativo.
21		00:00:35	00:33:26	78,24%	Área Técnica : Enviar para Admnistrativo
22		00:01:10	00:34:36	80,97%	Administrativo : Registar na Planilha de controle de Stencil.
23		00:02:35	00:37:11	87,01%	Administrativo : Enviar o Stencil reprovado para Descarte.
24		00:03:10	00:40:21	94,42%	Coordenação : Solicitar substituição Stencil reprovado
25		00:00:05	00:40:26	94,62%	Operador de Maquina : Fim do plano de produção.
26		00:00:03	00:40:29	94,73%	Operador de Maquina : Tranferir stencil da Produção para Armario de Stencil.
27		00:00:35	00:41:04	96,10%	Operador de máquina: Armazenar stencil no armário de stencil.
28		00:00:30	00:41:34	97,27%	Operador de máquina: registrar a transferência de local do Stencil no Formulário (Produção para Armário).
29		00:01:10	00:42:44	100,00%	Operador de Maquina : Verificar plano de produção ,

Figure 15: Stencil control in the process

Source: Author

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Entrepreneurship teacher training in high school in Bogotá (Colombia): A field to explore from the reality within schools.

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Abstract

Entrepreneurship is an issue that has positioned itself as a key element for decision-making by governments, in their aspiration to generate new alternatives for progress. Its involvement in education has led international organizations to consider it within their action plans. In the case of the Organization for Economic Cooperation and Development, its incorporation is in sight, especially in high school. Law 1014 of 2006 in Colombia supports the entrepreneurship class at schools in the country, intending to motivate processes that increase job opportunities and improve the quality of life of the society.

However, according to this law, the responsibility of leading concrete actions in the classrooms falls on the teachers who, despite the lack of training in entrepreneurship at the university degrees, courageously assume this challenge. Considering this situation, it is important to generate a discussion from the teachers' point of view in the framework of a qualitative investigation, through interviews and documentary analysis, configures an inquiry resulting from the approach to their experiences, concerns and needs for a quality teacher training, that assumes entrepreneurship based on the demands of the new millennium.

Hence, this reflection article is inclined to present the tasks aimed at the implementation of entrepreneurship in high school, from the experience of the teachers and instructors of the National Learning Service, through an approach to the reality of some schools in the city of Bogota. As a result, it was possible to demonstrate their efforts, learn about their implementation style and uncover this immense field to explore within the lack of training offered by universities and institutions in charge of providing training to teachers and those who are being prepared to become ones.

Keywords: Entrepreneurship, high school, teacher, training.

Introduction

Entrepreneurs, as "Agents of Change" in the vision of Casson & Casson (2013), are people who can be pressured to promote rapid changes. An entrepreneur who does not have ideas for change can be changed by someone who does. The National Development Plan in Colombia assures that through entrepreneurship, economic and social changes can be generated, which for teachers become a challenge because they lack support in their daily work. In Colombia, with Law 1014 of 2006 about "the promotion of the culture of

entrepreneurship", the issue is embraced, involving education and its interests. Likewise, Law 1429 of 2010 considers the formalization and employment generation, assist in the creation of companies by young people. From high school, with the processes of articulation of the schools with universities and technical institutions, especially with the National Service of Learning SENA, a company-school link is established, and a new compendium of needs that teachers must face is created.

High school, which in Colombia is defined by law 115 (1994) as the level where "its fundamental purpose is to prepare the student to access Higher Education or Education for Work and Human Development" (Art. 27), it establishes that they are the last degrees of school training in the country which have a specific work training or university purpose, aspects that converge to promote the teaching of entrepreneurship. In this last school stage, in accordance with Law 1014, it must "strive for innovative productive development, creating conditions of competition with equal opportunities, expanding the productive base and its entrepreneurial capacity" (Camacho, 2010, p.35). As such, public educational institutions have been forced to implement entrepreneurship without considering the training of teachers to address this issue.

According to Díaz and Celis (2010): "Teachers in many cases perceive that the objective of their area is to generate self-employment or survival units so that their students can occupy themselves and have some income." (p.206). A perspective, which reinforces that entrepreneurship is conceived with a limited vision towards holding business fairs that promote self-employment. According to the study of the Institute for Educational Research and Pedagogical Development IDEP Sánchez and Gutiérrez (2013), "58% of the entrepreneurship teachers of the characterized schools are from fields and disciplines of administrative sciences or technical sciences. The remaining 42%, from educational sciences" (p.191). It means they have an emphasis on administration and lack of training in pedagogy or, on the contrary, pedagogues do not know about entrepreneurship.

For this reason, this writing aims to analyze the teaching practices of entrepreneurship teachers in Bogotá, the capital city of Colombia, and their perspective related to the need for training on this subject. The voice of school teachers and SENA instructors is exposed, which is facing the deficit of initiative of the faculties of education to promote training programs in the field of entrepreneurship. In the vision of Vergara (2016) "teaching practice is characterized by being dynamic (due to its constant changes), contextualized (because it is in situ) and complex (because understanding occurs according to time and space)" (p. 75). The teacher's practice in entrepreneurship education requires an approach which recognizes "the action that takes place in the classroom and with special reference to the teaching process" (De Lella, 1999, p.2), besides a characterization of experiences of educational institutions which have concrete actions on the subject.

Theoretical framework

Entrepreneurship, schools, and definitions.

There are various definitions of the term entrepreneurship, which arise from some schools of thought in this subject. These schools take, as central axis of their approaches, the way of perceiving entrepreneurs

according to their interests, their behavior, or simply their facet of creator. According to Cunningham & Lischeron (1991), there are six schools of entrepreneurship based on specific characteristics:

Table I. SUMMARY OF THE APPROACHES TO DESCRIBE THE ENTREPRENEURSHIP

SUMMARY OF APPROACHES FOR DESCRIBING ENTREPRENEURSHIP				
ENTREPRENEURIAL MODEL	CENTRAL FOCUS OR PURPOSE	ASSUMPTION	BEHAVIORS AND SKILLS	SITUATION
"Great Person" School	The entrepreneur has an intuitive ability- a sixth sense- and traits and instincts he/she is born with.	Without this "inborn" intuition, the individual would be like the rest of us mortals who lack "what it takes".	Intuition, vigor, energy, persistence and self-esteem.	Start-up
Psychological Characteristics School	Entrepreneurs have unique values, attitudes, and needs which drive them.	People behave in accordance with their values; behavior results in attempts to satisfy needs.	Personal values, risk-taking, need for achievement, and others.	Start-up
Classical School	The central characteristic of entrepreneurial behavior is innovation.	The critical aspect of entrepreneurship is in the process of doing rather than owning.	Innovation, creativity and discovery.	Start-up and early growth
Management School	Entrepreneurs are organizers of an economic venture; they are people who organize, own, manage, and assume the risk.	Entrepreneurs can be developed or trained in the technical functions of management.	Production planning, people organizing, capitalization and budgeting.	Early growth and maturity
Intrapreneurship School	Entrepreneurial skills can be useful in complex organizations; intrapreneurship is the development of independent units to create market and expand services.	Organizations need to adapt to survive; entrepreneurial activity leads to organizational building and entrepreneurs becoming managers.	Alertness to opportunities, maximizing decisions.	Maturity and change

Source: Cunningham & Lischeron (1991). (p.47).

These schools, based on personal qualities such as intuition, persistence, and self-esteem, are located in what the authors call the school of the Great person.

On the other hand, the school that is based on psychological characteristics highlights the values, attitudes, and needs focusing on the achievement of objectives. The classical school conceives innovation as the root of the growth of a productive idea. The management school emphasizes planning, production, and capitalization for profit. For the leadership school, constancy is required to motivate and direct concrete actions. Finally, the school of intrapreneurship supports the creation of independent market units and the expansion of services.

These definitions distinguish as a point of convergence the consistent evolution of the person towards economic growth. Hence, the Colombian government, with interest to adhere to the international policies of the Organization for Economic Cooperation and Development OECD, the World Bank, and other organizations, deploys concrete actions to implement this topic in the classrooms according to the needs of the communities and the resources available in the country.

The implementation of entrepreneurship in high school in Colombia

Intending to respond to the needs of entrepreneurship education in Colombia, Law 1014 (2006) is the first action, which frames the obligation for all educational institutions to incorporate this class. However, this regulation requires its implementation from preschool to strengthen culture and innovation in all educational levels. The inclusion of the class and the creation of a curriculum in schools have been supported by some guidelines offered by the Ministry of National Education MEN, such as guide 39: "The culture of entrepreneurship in educational establishments" in addition to its predecessors of 2006 and 2010 (Rico y Santamaría, 2018). These guides offered parameters for the construction of study plans for schools that incorporated the dynamics of entrepreneurship in their academic activities.

Another decisive action for the incursion of the entrepreneurial world in the scene of high school was the program of articulation between high school and technical and university education. It is a plan proposed by the MEN in 2008 its objective, according to the educational sector plan 2008 -2012: "Seeks the transformation of schools in their pedagogical, administrative, physical and organizational environment in such a way that the 10th and 11th grades assimilate and deploy appropriate and pertinent content and methodologies of higher education" (p.74). This program supports inter-institutional agreements with universities and institutions of technical education in the country with schools.

One of the most relevant strategic alliances of educational institutions for the implementation of the articulation is established with SENA. This institution, as the best known about technical education and entrepreneurship, offers programs that support schools in specific technical training in various fields. This cooperation is developed through the participation of SENA teachers and/or instructors to schools, loans of laboratories, and other facilities, in addition to technical qualifications for students. These instructors, in

association with teachers, develop their work in schools and show daily a network of relationships with students, parents, and the community with the ultimate aim of building their own teaching practice in the field of entrepreneurship.

Teaching practice and its connection with entrepreneurship in schools

Teaching practice, according to De Lella (1999), has a series of elements that build a constant interaction between teaching, learning, and community:

> The concept of practice also reaches other dimensions: global institutional practice and its unavoidable links with the whole of the teacher's social practice. At this level is located the potentiality of teaching for social transformation and the democratization of the school.

The available resources for schools to democratize the teaching practice in entrepreneurship create the necessary connection between the educational and the productive fields, in addition to alliances with higher education institutions. Where the teaching practice becomes a conscious act, as stated by Vergara (2017) "the practice cannot be carried out without a certain awareness of the purposes that guide it and without some knowledge of the object to be changed or modified" (p.77). As a result, teachers require continuous training that provides them with that knowledge to enrich their practice in the field of entrepreneurship and strengthen those changes they want to inspire.

Methodology

This work is based on conducting semi-structured interviews with four entrepreneurship teachers in secondary education, three instructors, two SENA program coordinators, and one public school principal, in addition to the documentary analysis regarding entrepreneurship in high school education. In this way, a descriptive qualitative study was set up, which shows the teacher's practice in their daily lives, reflecting their concerns, expectations, and needs, as part of their humanity. This qualitative approach is interested in people in constant evolution, an aspect that for Denzin & Lincoln (2005) shows that: "The field of qualitative research, consequently, is the world of lived experience, since this is where beliefs and individual actions intersect with culture" (p. 8). The world and the phenomena to be known to revolve around entrepreneurship as a culture and the way it is approached in secondary education in schools.

For Flick (2004), qualitative research "takes into account that practices and points of view in the field are different because of different perspectives" (p.20). As a consequence, when meeting directly with teachers and instructors, it is possible to identify relationships between them and the subjects around them, as a fundamental element for reflection. The principal, school teachers, instructors, and coordinators of SENA, establish a dialogue between the experiences collected, current regulations, and the views they assume considering the government policy regarding teacher training in entrepreneurship. The inquiry about the strategies they have designed to implement entrepreneurship in their institutions facilitated the approach

towards its incursion and adoption process in high school education, from the teachers and the panorama of their current practice at schools, all permeated under the influence of the educational public policy.

Results and Discussion

In the dialogue with high school teachers, instructors, and coordinators, belonging to SENA, whose role is to support activities in the schools which have articulation, it is found that there is a large gap between the expectations generated when the entrepreneurship is addressed in schools and the reality. "The topic of entrepreneurship is assigned to a teacher who is not tenured or who has no knowledge of the subject, simply tries to do a project" (Entrepreneurship teacher 1). "Entrepreneurship in SENA is not working as a cross curricular area, Law 1014 is not being applied. Those in charge of giving workshops in that area are psychologists" (Coordinator 1 SENA). According to these perspectives, the aspirations expressed in the policies are different from the processes that teachers are experiencing in their practice, especially in the availability of information about entrepreneurship they have nowadays.

In addition, regarding the needs and expectations of the implementation of entrepreneurship in the daily teaching practice, it was possible to identify that: "First, the educational stage should be strengthened, because teachers from various areas, and especially entrepreneurs, do not have pedagogy which brings innovation to the classes, everything is always a true copy of the original" (Instructor 3). As shown in the following table, there is a section for the analysis carried out for the interviews with the participants, referring to their point of view regarding the future of entrepreneurship in educational institutions.

Table II. PART FROM INTERVIEW WITH TEACHERS, INSTRUCTORS, COORDINATORS AND PRINCIPAL

Table II. PART FROM INTERVIEW WITH TEACHERS, INSTRUCTORS, COORDINATORS AND PRINCIPAL

ANALYSIS OF INTERVIEWS WITH INSTRUCTORS, TEACHING COORDINATORS OF ENTREPRENEURSHIP AND PRINCIPAL										
INSTRUCTOR 1	INSTRUC 2	INSTRUC 3	COORD 1	COORD 2	TEACHER 1	TEACHER 2	TEACHER 3	TEACHER 4	PRINCIPAL	ANALYSIS
5. What would be the future actions to strengthen the issue of entrepreneurship in education?										
To be clear about the system or to be clear about where the economic sectors of the country are going, is to direct the venture towards those economic areas where it really has relevance where we are going to have some expectation of growth. Thus, even the training, our training of those who teach entrepreneurship must be strengthened. It should provide a practical training not only the theoretical one. Which encourages what teachers need to know besides in which areas the growth strategies are needed in the country.	Educational entities regardless of their level must be really focused on creating companies. Have more training in entrepreneurship.	First, the educational stage should be strengthened, because teachers from various areas, and especially entrepreneurs, do not have pedagogy which brings innovation to the classes, everything is always a true copy of the original.	That the Ministry generates a policy especially for training in entrepreneurship which is not available at the universities for teachers. But that it is not simply a policy of the current government, but that it remains institutionalized, and on the other hand nowadays the process is not encouraged at schools by the principals, with all their teaching staff. So then, it is necessary to start at the schools to generate a differentiating policy from other schools.	Provide courses to teachers in order to provide students with different elements so that they learn to dream, to think about different realities not only situated in those that their environment offers them. Provide non-reimbursable support resources to students so they can start their own productive projects. Build a way to link students from schools articulated with SENA in a training chain, with technicians and professionals in the entrepreneurship area.	Create a curricula that really allows to all schools or teachers in the entrepreneurship area to have a route to follow. Unfortunately, every teacher who is teaching this area, is seeing it from their own point of view. The accountant will look at it from the accounting side, the administrator from the administration side, the engineer from the engineer's point of view. Then it would be the most viable thing for everyone to point towards the same path.	It means working with the students in several directions: 1. SKILLS: public speaking, arguing, reasoning and arguing. To write and present. They must learn all those "soft" skills. 2. ATTITUDES: Children must learn to cooperate, but understanding that cooperating is not mathematically dividing the work but exploiting together the points in which each one is good to create something even better. To fail, understanding that failure is a stepping stone on the road to success.	Train teachers because teachers know very little about entrepreneurship. Learning to undertake or teach entrepreneurship is just not done only with a board and marker, you have to develop skills in the students. And if teachers don't have those skills, well, they won't be able to develop them in their students. Begin to strengthen the study plans so that the entrepreneurial mentality begins to develop, not only the implementation of an entrepreneurship chair, but also concrete actions.	An entrepreneurial ecosystem must be defined about specific elements, not only the classroom is important, the curriculum. Definitely the training of the teacher and the development of entrepreneurial skills in the teacher is fundamental so that they can teach them to the students. Because a teacher who has never had a business or has never started one, how is he going to teach entrepreneurship? You have to develop other types of skills and especially those that are focused or related to the skills of the XXI century.	More teacher training mainly and of course generate actions or strategies that lead to this issue can be properly addressed and implemented.	**Generate institutionalized policies that allow to train teachers, because they have limited knowledge about entrepreneurship. Begin to strengthen curricula so that an entrepreneurial mindset begins to develop. Develop: "Soft" skills ATTITUDES: learn to cooperate, to fail, understanding that failure is a stepping stone on the road to success. To explore. KNOWLEDGE: critical subjects, subjects such as accounting, marketing, advertising and graphic design, financial mathematics, business ethics, financial intelligence, but always starting from a trained teacher.**

Source: Authors

A repeated complaint was found among teachers, instructors, coordinators, and managers regarding the urgent need for training in entrepreneurship. Nowadays, they are working based on the guidelines offered by some official documents, which do not provide enough information for the teaching practice on this topic. "Teachers know very little about entrepreneurship. Learning to undertake or teach entrepreneurship is just not done only with a board and marker, you have to develop skills in the students." (Entrepreneurship teacher 3). The role of the university is fundamental in the future of teacher training in entrepreneurship based on the deficiencies evidenced.

Regarding teaching practices in the field of entrepreneurship, it was possible to recognize that: "I would say that in most educational establishments it is taking place in a conventional way. Knowledge about the business model is transmitted. It is a business plan which the future entrepreneurs have not developed, neither the skills nor necessary competencies for the 21st century" (Entrepreneurship teacher 4). There is a deep-rooted sense of the selling of products at fairs, as the pinnacle of teaching work in the area.

The objectives pursued by the teaching of entrepreneurship vary according to the experience of the teachers and the alliances that they establish within the framework of technical training. The goals for SENA, are based on the success of the presentation of the productive project. Teaching practice in entrepreneurship is strongly influenced by SENA guidelines, compared with a study carried out by Rico and Santamaría (2018) at schools in Bogotá that shows technical training is a vital element that directly affects the implementation of entrepreneurship in schools: "The relationship between the Institutional Education Projects and the entrepreneurship class in schools revolves around technical training programs and training in General Labor Skills. Their transformations depend on the profile of the technical training programs" (p.110). The incidence of SENA practices within articulated schools is closely linked to the actions currently developed by teachers in their practices.

Conclusions

In the field of entrepreneurship in high school in Bogotá schools, the need to generate institutionalized policies that allow teachers to receive training is highlighted, by virtue of their limited knowledge about entrepreneurship and considering the study by Cadena (2017): "It is required that the teachers have specific knowledge to guide them about how a student with an entrepreneurial attitude should be trained" (p. 224). Therefore, the intervention of universities and institutions in charge of training teachers in undergraduate programs must be more dynamic on the subject of entrepreneurship as an immense field to explore.

The practice of entrepreneurship teachers is permeated by the philosophy of SENA as a leader of this topic in education and thanks to the program of articulation of high school with higher education, corresponding its relation with the guidelines offered by this institution which in general are inclined to motivate the consolidation of productive projects as the culminating stage of the high school entrepreneurship process. Still, they require more focus on the life project rather than a purely productive vision: "It is not enough the current options for establishing productive linkage and educational continuity designed to high school,

much more is needed for students of public schools to improve their skills" (Zamudio and Velásquez, 2012, p.148).

The actions that have been undertaken by the Ministry of Education, the local Secretary of Education, the universities, and other institutions involved in the issue of entrepreneurship at schools of Bogotá, were focused on supporting the articulation of high school education with the productive environment. The inter-institutional agreements that allow the linking of SENA instructors to schools are fundamental to include entrepreneurship at schools. However they have put aside the urgent need to consolidate training alternatives aimed at teachers in this area, observing the teaching experience, the variety of disciplinary training lines that teachers have, it is possible to identify they teach entrepreneurship at schools with their personal motivation and it is important to include it for example, in the university curriculum for undergraduate degrees and permanent training programs for teachers.

A fundamental challenge is posed according to the voices of entrepreneurship teachers and instructors who work in high school. The challenge of creating alternatives for teacher training in entrepreneurship that consider different skills and in accordance with the advancement of science and technology. Considering the perspective of Cortés, Parra, Rojas and Gutiérrez (2017) regarding the entrepreneurship policy in Colombia "the training of teachers and administrative personnel, and their transmission to students, must take into account the future of a knowledge society, its changes, and its local influence" (p.107). This horizon is ready to be studied and expanded not only by educators and researchers in education, but also by those who are responsible for generating the country's educational policy.

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Teacher Training in the School Context of Distrito Federal Countryside - Brazil

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Abstract

The article aims to analyze the continuing education of teachers working in public schools in the countryside in Distrito Federal (DF) - Brazil. In the light of Cruz (2017), García (1999) Molina (2008, 2011, 2012 and 2019), Arroyo (2012), Caldart (2008 and 2012), Freire (1980), Freitas (2019), Libâneo (2010) among others, the on-screen study underlies the materiality of teacher training, through a humanizing look at the bias of educating in schools located in rural areas of DF. The methodology is of a qualitative approach, being based on the theoretical methodological assumptions of Dialectical Historical Materialism as a way of explaining the real lived in history and work, permeated by the contradictions and mediations that make up the continuing education of teachers working in schools in the countryside of State Secretariat of Education of Distrito Federal (SEEDF). The results showed that public policies, research, construction of works and the "knowing and doing" of teachers advanced towards the construction of rural education in DF. It is worth mentioning that, despite advances, the study demonstrated that the specific training for the countryside at SEEDF, still needs to make progress with regard to teacher training schools (EAPE), as well as in-service training in times of coordination collective. In addition, the study showed the need for dissemination to the knowledge of teachers, with regard to legislation, public policies and Guidelines on Rural Education, as they also integrate training and can enable moments of action-reflection-action.

Keywords: Continuing Education; Rural Education; Public school.

1. Introduction

We realize that society is constantly affected by several transformations; they are changing that influence politics, culture, economics, as well as education. The educational institution builds its work based on the needs of the students, especially the school community. And the changes, which are being built every day in the school context, are the result of the struggle of the subjects in society, seeking a

new project for the education of the student.

One of the school's needs is teacher training. The dynamics of the teacher's work shows that training needs to be within its scope, considering that teaching is transformed and students demonstrate new deficiencies in what concerns their learning.

Teachers need to adjust their teaching strategies according to each situation; nevertheless, the school also needs to adapt its action plan, its Pedagogical Political Project, regulations and other legislation and pedagogical actions.

In this way, we can think of different educational contexts. Rural schools, for example, are inserted in a context different from that of urban schools, considering that they need to have their specificities, peculiarities typical of rural life, adequate in terms of calendar, curriculum, as well as in their pedagogical and educational practices. teaching, aimed at student learning in favor of human emancipation and transforming their social reality. For this materiality, we entered into understanding the conception of rural school, in the light of Molina and Sá (2012, p.325):

> The conception of rural school to be dealt with here is rooted in the process of the struggle of the working class for the overcoming of capital. Access to knowledge and the guarantee of the right to schooling for rural subjects are part of this struggle. The specificity of this insertion is manifested in the concrete conditions in which the class struggle takes place in the Brazilian field, in view of the way of expanding AGRIBUSINESS and its determinations on the struggle for land and the class identity of collective subjects. The concept of a school in the countryside is also part of the Gramscian perspective of the UNITARY SCHOOL, in the sense of developing epistemological strategies that materialize the project of omnilateral humanist training, with its unitary integrating base between work, science and culture, in view of the training of intellectuals of the working class (MOLINA and SÁ, 2012, p. 235).

From Molina and Sá (2012), it is understood that the rural school starts from a conception of the struggle movement; has as principles the Gramscian perspective that brings the meaning of a unitary school. In this way, it aims to bring to the school curriculum, to planning and to classes, the debates of conflicts, as well as the history, social and political reality of work, science and culture of the subjects of the field. In this sense, Gramsci (2004), highlights that:

> Culture is quite different. It is organization, discipline of the inner self; appropriation of one's personality, conquest of higher consciousness; it is thanks to this that one can understand his own historical value, his own function in life, his own rights and his own duties (GRAMSCI, 2004, p. 58).

Thus, understanding that there are several contexts that demand knowledge of their reality, the objective of this study emerged: to analyze the continuing education of teachers working in public schools in the countryside in Distrito Federal. Discussing teacher training in rural schools is important, as Arroyo (2012) maintains:

> This defense of a more plural formation is justified in the political function expected of the rural school. It must be a space in which the knowledge of land, labor and peasant agriculture are incorporated; in which the specificities of being-living childhood-adolescence, youth and adult life in the countryside are incorporated into curricula and educational proposals; in which

> knowledge, conceptions of history, society, liberation, learned in social movements are part of school knowledge (ARROYO, 2012, p. 363).

In defense of this more plural formation, this essay seeks to understand the context of continuing teacher education in rural schools in Distrito Federal, from a critical perspective, revealing the contradictions of the social, historical, political and cultural reality of the subjects of the field. In this sense, it is necessary to know the work, the knowledge of the land, the class struggles and the concepts of society.

In a dialectical perspective, knowledge must enable the exercise of action-reflection-action, which leads to the transformation of the teaching practices of teachers in schools, through continuing education. "That is why, in the permanent training of teachers, the fundamental moment is that of critical reflection on practice. It is thinking critically about the practice of today or yesterday that can improve the next practice" (FREIRE, 2009, p.39). As Freire (2009) points out, we think that training should not only provide an update of knowledge, but also a reflection on its practice, adapting to the reality of its students, as well as the specific context of Rural Education.

2. Rural Education: a Brief History

Rural Education is a modality understood as a principle of political, educational action and practices developed by the subjects of the countryside, builders of knowledge, as stated Caldart (2012):

> Rural Education names a phenomenon of the current Brazilian reality, led by rural workers and their organizations, which aims to focus on education policy from the social interests of education from the social interests of the peasant communities. Objective and subject to refer to the issues of work, culture, knowledge and social struggles of peasants and to the (class) clash between field projects and between agricultural logics that have implications for the country and society project and in the conceptions public policy, education and human training (CALDART, 2012, p. 257).

Rural Education was born out of the class struggle of rural workers, farmers, peasants, extractivists, fishermen, in favor of a new project, linked to the fundamental elements that are part of the life of rural men and women, that is, the agrarian reform and the struggle for land (MOLINA, 2012). These are two inseparable elements of this conception, which is political and involves the right to education (MOLINA, 2020), considering that "the materiality of origin (or root) of Education in the Countryside requires that it be thought / worked on always triad: Field - Public Policy - Education" (CALDART, 208, p.70). And in the materiality of understanding this triad, we illustrate in Figure 1 the principles of rural education.

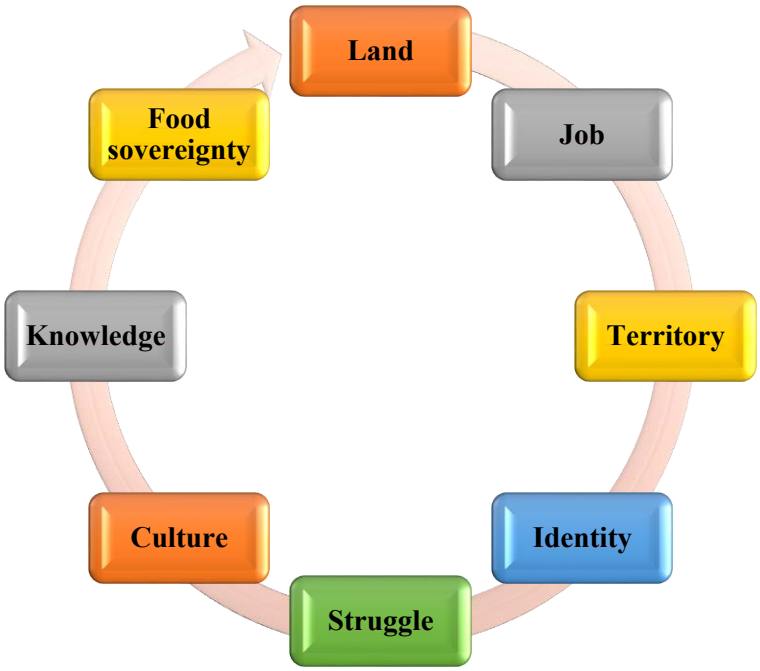

Figure 1. Principles of Rural Education
Source: Prepared by the authors from Caldart, Molina and Sá (2012).

The class struggle that is built for the right to education in the countryside, is sustained from a broad and revolutionary sense, which seeks to break with the pragmatism dominated by capital (MOLINA and SÁ, 2012). When there is a withdrawal of the rights and duties of subjects from the countryside, it is necessary that the class struggle seeks a school project linked to agrarian issues, the struggle for land and an education that recognizes and discusses these realities. From this, there is a struggle for transformations, for conflicts in the countryside, rivers, lakes, seas, waters, food, peasantry, fishing, handicrafts (MOLINA, 2020), as well as the struggle for the formation of teachers.

This struggle project composes the sense and the meaning of an education in the countryside, based on its materiality. After all, "Education in countryside is overcoming - project / utopia: projection of another conception of the countryside, of society, of the relationship between country and city, of education, of school. Perspective of social transformation and human emancipation (CALDART, 2008, p.75). In this dialogue, we understand that the Rural Education project is aimed at social movements, which are also fighting for training.

> The intentionality of a project for the formation of subjects who critically perceive the socially accepted choices and premises and who are capable of formulating alternatives for a political project, attributes to the rural school an important contribution to the broader process of social transformation. It poses the challenge of conceiving and developing counter-hegemonic training, that is, of formulating and executing a political project for social transformation, led by the working class, which requires the integral training of rural workers, to simultaneously promote transformation the world and human self-transformation (MOLINA; SÁ, 2012, p.325).

After understanding the concept of Rural Education, we present its legal frameworks; after all, it was in this spirit of struggle for rights that Education in the Countryside was born in the Brazilian

historical context, as Caldart (2008):

> Rural Education was born as a mobilization / pressure of social movements, for an educational policy for peasant communities: it was born from the combination of the struggles of the landless for the implantation of public schools in the areas of agrarian reform with the resistance struggles of countless organizations and communities peasants so as not to lose their schools, their education experiences, their communities, their territory, their identity (CALDART, 2008, p.71).

It is in this movement of struggle that we highlight the rural school as a school that brings pedagogical reflections, starting from the reality and territoriality of its subjects, in addition to working on the social, cultural, political, economic wealth of peasants and rural workers, linked to a project of a supportive, humanizing, emancipatory and liberating school. These characteristics were consolidated over time and from historical moments, such as, for example, the 1st National Conference for Basic Education in the Countryside. At this conference, Brazil was taken over by a new construction project, which began to conceive; in this way, we have 22 years of struggle and historical construction of Rural Education.

In view of this scenario, the historical process of Rural Education has been built by legal milestones in history and through the class struggle of workers, as Caldart (2012, p.257 e 258) maintains:

> The appearance of the expression “Education in the countryside” can be dated. It was born first as Basic Education of the countryside, in the context of preparation of the I National Conference for Basic Education of the countryside, held in Luziânia, Goiás, from 27 to 30 of July 1998. It started to be called Education of the countryside from the discussions of the Seminar Meeting held in Brasília from 26 to 29 November 2002, a decision later reaffirmed in the debates of the II National Conference, held in July 2004.

The I National Conference for Basic Education in the countryside held in the city of Luziânia in Goiás was essential to outline and move the struggle for the construction and implementation of public and educational policies in the field of Rural Education. Thus, from that year on, programs were implemented and solidified the achievements for agrarian reform projects, initial reading instruction, literacy, teacher training, youth and adult education, technical courses, undergraduate courses, among others, as highlighted in Figure 2.

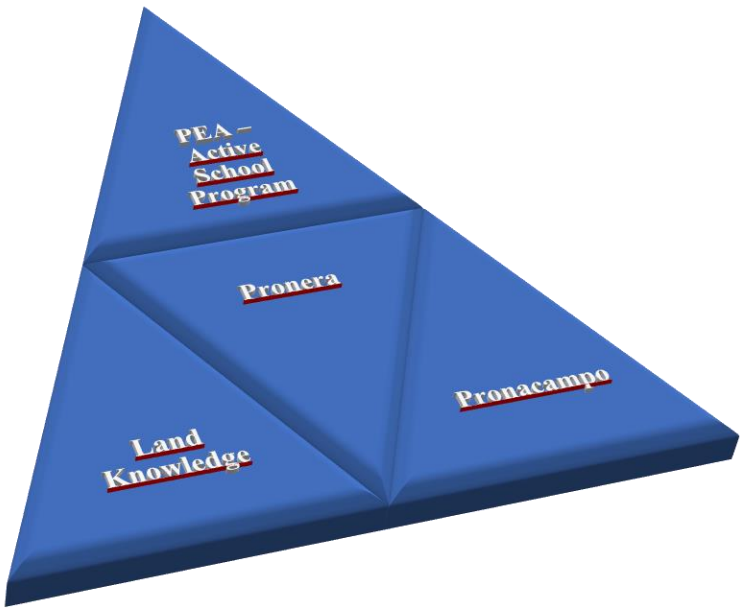

Figure 2. Public and Educational Policy Programs for Rural Education
Source: Elaborated by the authors from Santos (2014).

Figure 2 highlights projects and programs on Rural Education, described below:

a. **PEA– Active School Program**. It is a political and educational policy. Created and developed in Brazil under the Fernando Henrique Cardoso government, it focuses on initial reading instruction, literacy, game technology and pedagogical management (DISTRITO FEDERAL, 2019).
b. Land knowledge - Program created in the Government of Luiz Inácio Lula da Silva based on the Law of Directives and Bases of National Education - LDBEN nº 9.394 of 1996. Proposes an educational policy to serve young people between 18 and 29 years old, who live in the Rural Zone, as well how to provide teachers who attend school units of rural education with training and qualification, in order to meet the peculiarities of the local curriculum, such as: citizenship, identity, family farming, gender and production (DISTRITO FEDERAL, 2019).
c. Pronacampo – This is a policy that sought to guarantee not only the right to access, but also the people who live in the countryside. Another objective of the program is also to enable the training of teachers for the quilombola area, taking into account all the training axes such as: management, teacher training and education of young people and adults. (DISTRITO FEDERAL, 2019).
d. PRONERA – National Education Program on Agrarian Reform. This is a program that was born out of a revolutionary action of a political act, in search of improvements for rural education. It was from a march with a 100 thousand workers, including young people and adults, that the implementation of the PRONERA program was born, by Decree Nº 10 of 1998. It is a program that has the central objective of promoting formal education to all levels of education in the countryside. To this end, it develops all levels of basic and higher education (DISTRITO FEDERAL, 2019).

In view of this view, Education in the Countryside within the scope of the State Department and Education of Distrito Federal grew and occupied its space based on these public and educational policies, consolidating itself and being constituted by legal frameworks. Chart 1 presents Brazilian legislation that stood out in the context of Rural Education.

Chart 1. Legal Frameworks for Rural Education in Brazil

Legal Frameworks for Rural Education in Brazil	
Laws	Features
Federal Constitution of 1988	Art.205 - Education is a right for all and a duty of the State and the family, it will be promoted and encouraged with the collaboration of society, aiming at the full development of the person, their preparation for the exercise of citizenship and their qualification for work.
LDB - Law nº 9.394 of 1996	Art. 28. In the provision of basic education to the rural population, the education systems will promote the necessary adaptations to their adequacy to the peculiarities of rural life and of each region. It also deals with the closure of rural schools.
CNE / CEB Opinion nº 36, December 4, 2001	Resolution that establishes Operational Guidelines for Basic Education in Rural Schools. It establishes principles and procedures that aim to adapt the institutional design of the Schools of the countryside to the other national guidelines applied to education.
CNE / CEB Opinion nº 01, April 03, 2002	Institutes the Operational Guidelines for Basic Education in Rural Schools, based on Opinion 36/2001, mentioned in the previous item.
Opinion CNE / CEB nº 01, February 02, 2006	Establishes school days and standardizes activities for the application of Pedagogy of Alternation in Family Centers for Alternation Training (CEFFA).
CNE / CEB Opinion nº 03, February 18, 2008	Re-examines another opinion, which, in turn, has not yet been approved, deals with the consultation regarding the guidelines for serving Rural Education.
CNE / CEB Opinion nº 2, April 28, 2008	It establishes complementary guidelines, norms and principles for the development of Basic Education in the Countryside, defining criteria for the nucleation of schools and attendance for

	school transport, with the concern to expand the possibilities of offering education as close as possible to the students' homes.
Federal Law, nº 11.947 of June 16, 2009	Provides for school meals and the Direct Money at School Program (PDDE).
Federal Decree nº 6.755, of January 29, 2009.	Institutes the National Policy for the Training of Professionals in the Teaching of Basic Education and disciplines the work of the Coordination for the Improvement of Higher Education Personnel.
Federal Decree nº 7.352, November 4, 2010.	Provides for the Rural Education Policy and the National Education Program on Agrarian Reform (PRONERA).
CNE / CEB Resolution nº 04/2010 of July 13, 2010	Defines General National Curriculum Guidelines for Basic Education. Regulates the modality of rural education.
District Education Plan with Goal 8 of the PDE	Guarantee of basic education for the rural population of DF, in rural schools.
Theoretical assumptions of the Rural Education Movement Curriculum	Assumptions based on the theory of Historical-Critical Pedagogy and Historical-Cultural Psychology, in search of a transformative praxis.
Basic education policy for rural education from Decree nº 419 of 2018	It institutes the Rural Education policy, highlights the principles, organization and functioning of the Rural Schools, among other guidelines.
Country Education Guidelines (SEEDF)	2019 document that presents the normative frameworks, the curricular and pedagogical organization of Rural Education in public schools in DF.
Law nº. 6.502, of February 7, 2020	Institutes and includes, in the official calendar of events in the Federal District, the Continuing Education Day for Education Professionals, to be celebrated annually on August 10. The proposal of a day dedicated to the continuous training of teachers and other employees of the State Department of Education, symbolizes the recognition of a strategic public policy for the quality of public education in Distrito Federal (EAPE, 2020, p.4).

Source: Built by the authors from Distrito Federal (2019, p.27); Law 9.394 (1996); Constitution of 1988; EAPE (2020).

The public and educational policies built for rural education were born from a historical, pedagogical, social, cultural and political commitment, based on the social movements themselves, the needs of rural subjects in the Distrito Federal, as well as the needs of proposals the "school floor", pedagogical practices, rural workers, among other factors. For Molina (2008, p.23), the 1988 Federal Constitution itself, when reaffirming education as a right for all, brings:

> This central idea of the foundation of collective action by social subjects in the countryside in the struggle for the construction of their right to education: the equality declared in the Constitution is not restricted to a mere formal provision. It guarantees and demands concrete actions by the State in order to materialize the concrete exercise of the rights of all citizens (MOLINA, 2008, p.23).

This foundation consolidated the right to rural education within the DF. However, only the right does not guarantee access; permanence is not guaranteed only with the fact that schools remain open or closed; access and permanence are also related to the issue of infrastructure in the rural area of public schools, transportation, food, teacher training, among other elements that characterize rights that are not only instituted in the Federal Constitution of 1988, but also in LDB 9.394 of 1996, as presented in (Chart 1) - legal frameworks and as Molina (2012, p.452) argues, "[...] the guarantee of the right of subjects in the field to build a system of teaching from the countryside to the construction of socio-cultural diversity, requiring organization and methodologies, and curricula that address their specificities".

It is noticed that the rights are foreseen in the laws, so that the social movements, the working class, as well as the subjects of the field, have been fighting for these rights to be actually concretized in practice and realized in the projects of an education of / in field. And so, articulated with the network of the State Secretariat of Education of Distrito Federal, the growth of these public policies and demands for continuing education of teachers emerged to be implemented by EAPE - Secretary for Continuing Education for Education Professionals.

3. Rural Education in the State Secretariat of Education of Distrito Federal

To think about the centrality and materiality of Rural Education in public schools in Distrito Federal, it is necessary to reflect and conceive as the central axis who are the subjects of the countryside in DF. In this sense, we take as a reference the SEEDF Pedagogical Guidelines for Rural Education (2019, p.27):

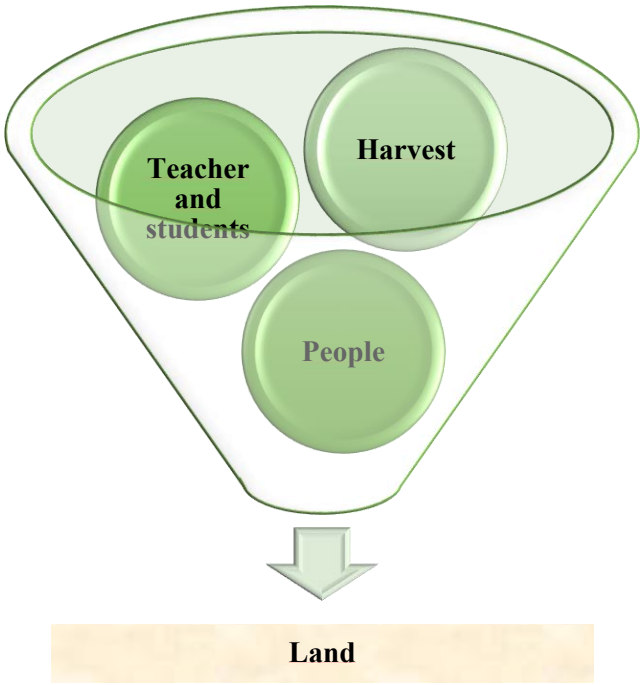

Figure 3. The subjects of DF countryside
Source: Created by the authors (2020) from the document Rural Education Guidelines (Diretrizes da Educação do Campo) and Distrito Federal (2019).

Rural subjects in the Distrito Federal represent the builders of the Rural Education project developed in recent years, so that their roots, histories, cultures, values, work, allow reflecting on the subject's way of being. Therefore, the project and the curriculum are built from the reality of the production process, land reform, the peasantry; that is, indicators that constitute the representation of the pedagogical guidelines that make the school in the countryside, from the centrality of the times and formative spaces that are constituted in the DF, as it maintains Molina (2012, p.468):

> Due to the accumulated understanding in Rural Education, of the centrality of different times and formative spaces existing in rural life, in the struggles of the subjects who live there and who organize themselves to continue guaranteeing their social reproduction in this territory, the training action developed by these educators must be able to understand and act in different spaces, times and situations.

The current formative scenario of the State Department of Education of Distrito Federal (SEEDF), with regard to schools of Rural Education, is contextualized from a network of 80 schools distributed in 09 administrative regions of Distrito Federal, in which it is possible to highlight that present in the most different types of teaching, in order to serve the child audience, in addition to young people and adults, in line with the assumptions of the curricular axes of basic education and for Rural Education. Therefore, SEEDF meets the following overview in the scope of the 9 administrative regions:

Chart 2. Rural Schools in Distrito Federal

Rural Schools in Distrito Federal		
Modality	Amount	Level
EC – School Class	52	Child education 1st to 5th year
CEF – Elementary School Center	16	6th to 9th year
CED – Educational Center	10	High school
ECP – School Class Park	01	Child education 1st to 5th year

Source: Built by the authors from Distrito Federal (2020).

The construction of rural schools was designed to serve the public that lives in the countryside, so that, in the role of education, they come to dialogue with the reality of these subjects who live in this territory. In addition, rural schools understand that their public cannot be discriminated against in the context of their learning, being seen as backward people or who have to learn less; on the contrary, the curriculum must be adapted to meet the issues of the peasantry, the worker and the rural family, without taking away the right and the duty of the student to learn the necessary contents that can lead to the process of transforming their reality, through of knowledge.

Currently, thinking about rural education in these 09 administrative regions of DF, is to take into consideration that rural students are historical subjects, who read the world of work, as many began to work from an early age in agriculture, farming, farm, fishing, peasantry, etc., and in this way, the work carried out in the rural area is characterized by people who live and work to support the family. In this way, it is understood that the subjects of DF countryside are the rural producers themselves, the settlers and the people of the movements that fight for the rural land.

With this in mind, we believe that it is difficult for rural subjects to leave their territoriality to go to the city or another location in search of their essential right, which is education. Thus, in Chart 3 we present the mapping of school units in rural education by CRE - Regional Teaching Coordination, that is, the number of rural schools by region.

Chart 3. Mapping of rural education school units

CRE	Number of schools
Planaltina	20
Paranoá	14
Brazlândia	12
Sobradinho	12
Gama	7
Ceilândia	5
São Sebastião	4
Núcleo Bandeirante	3
Santa Maria	1

Source: Built by the authors from the Field Guidelines for SEEDF (DISTRITO FEDERAL, 2019, p.27)

Chart 3 highlights the mapping of school units in Rural Education within Distrito Federal, in which the Planaltina Administrative Region leads, presenting 20 rural schools. Second, we have Paranoá region with 14 schools, Brazlândia and Sobradinho with 12; the other highlighted regions have less than 8 schools, with Santa Maria having 1 rural school. This perspective points out that SEEDF has not been silent in the face of the social and cultural reality that faces the educational need in the rural area of Distrito Federal. We observed that, in the locations where there are needs to build rural schools, SEEDF has been seeking efforts to meet these demands. In Chart 4 we demonstrate the modalities of education (CED – Educational Center, CEF – Elementary School Center, EC – School Class, EP – School Class Park) of the field and the quantity in each administrative region.

Chart 4. Mapping of Rural Education modalities in schools in Distrito Federal

CRE	Schools	Quantities
Brazlândia	CED	03
	CEF	01
	EC	05
	EP	01
	ECPA	01
Ceilândia	CED	01
	CEF	01
	EC	03
Gama	CED	02
	CEF	03
	EC	02
Núcleo Bandeirante	EC	03
Paranoá	CED	01
	CEF	02
	EC	11
Planaltina	CED	04
	CEF	04
	EC	12
Santa Maria	CEF	01
São Sebastião	CEF	01
	EC	03
Sobradinho	CED	01
	CEF	01
	EC	11

Source: Created by the authors from Distrito Federal (2020).

It can be seen in Chart 4 the reality of SEEDF: the EC are presented as the largest number of

schools in the countryside of DF, serving children from Elementary School I, which corresponds from the 1st to the 5th year. It is worth noting that the fact of building schools is not enough; it is necessary to fight to keep these institutions open, since the public is smaller compared to urban schools. Thus, one of SEEDF rules for keeping a school open is the minimum number of students; what can happen is not reaching that amount and schools are closed. In Chart 5, it is possible to see the mapping per student of rural education in public schools in Distrito Federal.

Education Field of Distrito Federal		**Child education**	**Elementary School**	**High school**	**Youth and Adult Education**	**Special education**
Total Schools	80 Schools					
Total Students	24.249 students					
children's daycare		108 students				
Pre School		2.580 students				
Early Years			10.325 students			
Final Years			6.421 students			
				1.982 students		
1st segment and 2nd segment (elementary school)					1.047 students	
3rd segment (high school)					454 students	
Professional Education integrated with EJA					35 students	
						30 students

Chart 5. Mapping Rural Education in schools in Distrito Federal

Source: Created by authors from Distrito Federal (20200.

In Chart 5 it was possible to see that Rural Education in Distrito Federal meets 05 levels of Basic Education, being held in: Early Childhood Education, Elementary School I and II, High School, Youth and Adult Education and Special Education.

Being carried out at different levels, Rural Education is a modality / project that needs to be articulated with other projects of society, that is, the project of a rural school must be thought and built to articulate with the projects of food sovereignty and human emancipation; therefore, it is necessary to think of education as a right for all. For this right to occur intentionally, we think of its articulation with the continuing education of teachers. Accordingly, Molina and Antunes-Rocha (2014, p.226) argue that Rural Education, as well as teacher training,

> [...] articulates with the social and economic projects of the field, from the perspective of a popular development project, which creates and establishes a direct connection between training and production, between education and political commitment. A school that, in its teaching and learning processes, considers the cultural universe and the proper forms of learning of the people of the countryside, which recognizes and legitimizes these knowledges built from their life experiences; a school that becomes a tool of struggle for the conquest of their rights as citizens and that forms the peasants themselves as the protagonists of these struggles, as the organic intellectuals of the working class.

Thus, we think that continuing education is of paramount importance for teachers, as it makes it possible to improve their pedagogical practices based on experiences, built knowledge, the recognition of struggles and conflicts that permeate the subjects of the field, allowing the construction of a new planning , a new evaluation and a new project based on this action-reflection-action, considering that "awareness cannot exist outside of 'praxis', or better, without the action-reflection act. This dialectical unity constitutes the way of being or transforming the world" (FREIRE, 1980, p. 26).

And so, continuing education makes it possible for DF teachers to contribute to work in these spaces in order to conceive time, space and territoriality. In addition to the pillars of rural education and the curriculum, as well as the planning of practices, management, coordination, in the act of thinking, doing and being of the subject of the countryside.

4. Teaching Training and Formation for the Countryside

Continuing the theme of training, it is important to highlight the teaching profession in its formative processes. We realize that teachers face several challenges in their daily lives: the heterogeneity of the classes, the large number of students in small rooms, the bureaucratic pressure to carry out projects and content, in addition to the singularities of the locations where the schools are located and the specificities of each student in the teaching and learning process. To deal with these and other challenges, the teacher is guided, first, by his initial formation process: Pedagogy. Libâneo (2012, p.38) informs us that:

> The Pedagogy course should form the pedagogue Strictu Sensu, that is, a qualified professional to work in various educational fields to meet formal and non-formal socio-educational demands, arising from new realities.

Pedagogy, as an initial training, provides the theoretical basis for the teacher to work with his pedagogical practices, especially in the classroom, as teaching is one of the elements that constitute his professional identity.

In this way, it is in the classroom that the teacher builds his identity and is faced with numerous situations where it becomes necessary to think of diversified strategies for learning to occur. Thus, the importance of continuing education is verified, since initial training will not always be able to meet all these demands. García (1999, p.26) highlights that:

> Teacher training is the area of knowledge, research and theoretical and practical proposals that, within the scope of Didactics and School Organization, study the processes through which teachers become involved individually or as a team, in learning experiences through which acquire or improve their knowledge [...] and allow them to intervene professionally in the development of their teaching, curriculum and school, with the aim of improving the quality of education that students receive.

In this sense, we understand continuing education as that which provides the teacher, not only with an update of practices, but with knowledge and reflection on his pedagogical practice. When planning his classes, his teaching strategies, the teacher needs to be aware that teaching and learning needs to be something with intentionality; analyzing the context of each situation and of the students in a specific way is of fundamental importance to build this process. This training, which proposes a reflection of their actions, is linked to a current vision of continuing education: teaching professionality, addressed by Cruz (2017, p.23):

> [...] the concept of professionality (...) is inserted in a series of relationships about what it means to "be a teacher", what is the knowledge that characterizes you as a professional and what are the processes based on certain perspectives of teacher education.

Training in the context of teaching professionality considers that "being a professional" starts in their initial training; it consists of experiences, in their way of working, in the relationship with their peers, as well as in the courses that the teacher takes during his career. Thus, we realized that in the course of the formation and constitution of the teaching profession, the social demands that affect education, lead to the need to adapt to new contexts.

When talking about different contexts, we highlight Rural Education again. It cannot be said that the realities of urban and rural schools are the same; are different realities, which encourages reflection on what type of training is being offered to teachers in the countryside? Is it the same formation as urban schools?

Certainly, these are two different realities and require specific training, which have been created over the years through public policies. Thus, when talking about Rural Education and the training of teachers who teach in rural schools, we cannot fail to quote Decree nº 7. 352, of November 4, 2010, which provides for the Education Policy in Agrarian Reform - PRONERA.

As previously highlighted, one of the objectives of this policy is to offer formal education to the public in the countryside, improving conditions of access to education, as well as improving the development of rural settlements; PRONERA also offers support for professional training, formation, continuing education, organization of teaching materials.

This Decree, signed in the Lula government in 2010, highlights the Rural Education policy aimed at qualification, with regard to the implementation of the offer of initial and continuing training in this sector. Art. 2nd item III (BRASIL, 2010, p. 2) highlights that one of the principles of Rural Education is the "development of training policies for education professionals to meet the specificity of rural schools", as local characteristics are considered for the formulation of these policies. Thus, we emphasize that rural education has specificities that must be observed for the adoption of training methodologies.

It is also important to highlight that PRONERA's contribution is not only related to the formation and promotion of public policies; the program also contributes towards promoting education "a task of liberation in relation to the dependence of the dominant culture and the construction of the very conception of the world and of life" (MOLINA and JESUS, 2011, p. 60).

In this way, we understand that, through training, it is possible for teachers to acquire knowledge about their role in the different educational realities, in order to develop strategies to welcome all students, regardless of the difficulties encountered and their region; in addition, think about their pedagogical practice and contribute to the autonomy of their students, so that they can fight for their ideals. Training policies recognize that people are entitled to specific adjustments and in the case of education "from" and "in" the field:

> The achievements achieved today are the result of government recognition and a new posture by the State, the struggle of social and union movements, the resistance of workers to the emptying of different forms of life in the countryside, as well as the involvement of an increasing number sectors of society in this struggle (BRASIL, 2009, p. 16).

In this bias, we emphasize that it is necessary to provide the student with conditions for learning in its various realities and locations, based on a reframed practice; thus, we have the support of teacher training policies, as well as those that are typical of rural education.

4.1 *Teacher training at the State Department of Education of Distrito Federal*

As we have already pointed out, working in the teaching profession, whether in public or private schools, involves constant challenges. Certainly, teaching in a school environment requires preparation to deal with students, in view of the different realities in which formal learning environments are found.

With this in mind, the State Department of Education of Distrito Federal - SEEDF understands that teachers need continuous training. In order to promote support and assist in new reflections and learning about the complex process that involves teaching and learning, EAPE was created, currently the Secretariat for Continuing Education of Education Professionals. SEEDF legislation, Ordinances nº 11 of January 29, 2019 and nº 503 of November 14, 2017, provide for EAPE with regard to its administrative and pedagogical organization.

Art. 5 of Ordinance nº 11 (DISTRITO FEDERAL, 2019), establishes that EAPE main task is to promote the continuing education of professionals in the public teaching career in Distrito Federal, with the "objective of re-elaborating the initial knowledge of teacher training and fostering practices to improve the quality of teaching and learning" (p. 1). Training can also be offered at SEEDF from the Secretariat for Basic Education (SUBEB), by the Regional Teaching Coordination (CRE), through the Regional Basic Education Units (UNIEB) and the Reference Centers for the Early Years (CRAI).

Thus, in order to promote continuing education, it is necessary to observe the demands of professionals, in view of the different situations, demands and contexts of each school environment, based on the needs and priorities of public schools in DF, in order to request formations. SEEDF is made up of schools in the urban and rural areas. Thus, we understand that because they are diverse environments, training must also be specific.

Through documentary research, we observed that in the period from 2014 to 2019, EAPE courses were offered in the field of Rural Education, as highlighted in Chart 6:

Chart 6 – EAPE Teacher Training Courses - Rural Education

EAPE Teacher Training Courses - Rural Education				
COURSE	PUBLIC	HOURS	MODALITY	YEAR
Rural Education in Distrito Federal: training coordinators	Intermediate Coordinators of Rural Education from regionals that have rural schools: Planaltina, Sobradinho, Brazlândia, Paranoá, Gama, Núcleo Bandeirante, São Sebastião, Taguatinga	120h	Presential	2014
Training workshops in rural education	ECC, PAC and local communities /Gama.	------	Presential	2018
Continuing Education of the "Escola da Terra" Program	Teachers working in the field of Rural Education and / or in School Units in the field.	180h. Certified by the University of Brasília with pedagogical supervision by SEEDF.	Presential	2018
Opening Trails to the Rural School	Educators who work in rural schools in the Regional of Sobradinho.	120h.	Semi-presential	2019
Walking in Campo do Paranoá - Steps for	Rural Educators at CRE Paranoá.	120h.	Semi-presential.	2019

Participatory Inventories				
Investigative tools in Rural Education	Assistance and Teaching Professionals who work in rural schools in Distrito Federal	180h.	Semi-presential.	2019
Training Courses in Rural Education	Educators working in CEF and other rural schools at CRE Planaltina.	120h.	Semi-presential.	2019.

Source: Created by the authors from EAPE (2020).

In the 1st semester of 2020, EAPE offered teachers 4 courses that referred to rural education: "Guide trails and paths - environmental sustainability in schools in DF", "The theater of the oppressed as a tool of rural education - São Sebastião ","" Trails of doing in rural education in Planaltina ", The Territory as a Pedagogical Tool in Rural Education - Sobradinho. Therefore, even with a small number of courses in the semester (4), it is possible to say that specific training in the field is being offered to teachers in the public school system in Distrito Federal.

We also highlight the launch of the SEEDF document entitled Pedagogical Guidelines for Basic Education in the Countryside in DF (DISTRITO FEDERAL, 2019), which brings in one of its chapters the context of continuing education. The importance of specific training for the field is emphasized and "[...] education professionals who work in rural school units, without specific training in Rural Education, must necessarily participate in courses, or in other actions of education. training "(p. 37). SEEDF informs that it is necessary to carry out this training with appropriate proposals and methodologies, based on theoretical approaches that support Rural Education.

In this context, for an effective teaching practice, it is necessary for the teacher to understand his relationship with the local culture, with the valuation of sustainability, food, work, among other aspects inherent to the field.

The training of teachers must be recognized as an instrument that can lead to the construction of critical thinking, reflection on the educational space, in order to transform the reality in which it is inserted, because "it is necessary that the educational process allows to overcome the obstacles that hegemonic culture places access to these conditions of transformation" (MOLINA and JESUS, 2011, p. 60). For the transformation to take place, there is an appreciation of its space, its reality, as influencing factors to become an environment in which there is the criticality of teachers and students, guided by a liberating and emancipatory education, aimed at the subjects of the countryside.

5. Methodology

The research started from a qualitative approach to the object of study, characterized by “detailed understanding of the meanings and situational characteristics presented by the interviewees, instead of producing quantitative measures of characteristics or behaviors” (RICHARDSON, 2002, p. 91). The qualitative study provided the interpretation of data in the analysis of information, with regard to the objective in thesis: to analyze the continuing education of teachers working in public schools in the countryside in Distrito Federal.

For the question and the purpose of the essay, the article was designed by a bibliographic and documentary research, contemplated in this study through the analysis of Brazilian documents and legislation on Education, mainly from the Ministry of Education (MEC / Brazil) and the Secretariat of State of Education of Distrito Federal (SEEDF / Brazil). For Marconi and Lakatos (2003), documentary research is characterized by a collection of data carried out through documents, whether written or not, from primary or secondary sources. Examples of primary sources can be cited: documents from public archives, parliamentary publications; and secondary sources can be statistical research.

After documentary and bibliographic research, field research took place. Parra and Almeida (2002) highlight that the field research is the consultation through questionnaires, interviews and others, together with the elements involved, which allow the analysis and conclusions, according to previously established objectives. This type of research "is based on observing the facts as they occur" (PARRA and ALMEIDA, 2002, p. 102).

The field research was carried out using the questionnaire instrument. For Marconi and Lakatos (2017, p.133), "the questionnaire is a data collection instrument consisting of an ordered series of questions, which must be answered in writing and without the presence of the interviewer". The questionnaire for this research was elaborated with 16 questions, being carried out through the Google Forms tool, sent online to the participants, who are professionals of the public teaching career of the State Secretariat of Education of Distrito Federal - SEEDF, with functions of: teachers, pedagogues, managers, working in rural schools.

For data analysis, we chose to use the theoretical methodological assumptions of Historical Dialectical Materialism, anchored in the thought of Karl Marx (1989). Triviños (1987, p.51) highlights that "historical materialism is the philosophical science of Marxism that studies the sociological laws that characterize the life of society, its historical evolution and the social practice of men in the development of humanity". Thus for an analysis of these assumptions, it is necessary to reveal man in his theory of being, understanding the dialectical movement that ceases to be apparent, to be unveiled in the essence of a being that is historical.

Marx (2004), brings in its materiality an epistemology that allows to understand the being as historical subject, because for this author it is only possible to unveil the real from the moment that the theory of ontology is understood, starting from the place that these human beings do part. The relationship takes place between subject and object in a dialectical way; thus, the method, in this understanding, is the path that leads the researcher to understand the concept of man and object in that society, from the class struggle, the economy, politics and culture (SILVA, 2019).

The unveiling of the essence occurred from the objective of this study and materialized in the analysis of the data, starting from the categories of materialism: historicity, work, mediation and contradiction. In this sense, to unveil the Continuing Education of teachers working in public schools in the countryside in Distrito Federal, we base ourselves on Historical Dialectical Materialism and agree with Gomide (2014, p.7), when it is said that:

> [...] Historical Dialectical Materialism as a method of investigation is essentially controversial and critical, as it seeks to overcome common sense, the dominant way of thinking by going beyond the reflection that is exhausted in itself. Critical knowledge, in this perspective, is guided by a posture of transformation of reality, that is, a reflection that implies movement, change, and not just limited to critical analysis. The apprehension of reality in its genesis, in the dialectical conception, articulates, at all times, theory and practice.

We believe that a critical and reflective analysis of the data is a path that seeks to understand society in its genesis, guided by a transforming thought of the reality that surrounds us.

5.1 The profile of the surveyed subjects

Starting from a qualitative approach (RICHARDSON, 2002), using the online questionnaire as a collection instrument, field research was carried out. Nineteen teachers from the public teaching career of SEEDF participated in this study phase and who work in rural schools, from different teaching regions, such as: São Sebastião, Riacho Fundo, Paranoá, Gama, Planaltina, Núcleo Bandeirante. To understand the data analysis, teachers were assigned numbers from 1 to 19.

With regard to personal data, 100% of the participants are female; in relation to age, 21.1% are between 26 and 35 years old, 36.8% between 36 and 45 years old, 42.1% are 46 years old or more. In academic training, 16 participants completed specialization courses, 2 teachers have a Master's degree. In the item “working time in the Department of Education of DF”, Table 1 shows the results.

Table 1 - Working time at SEEDF

	Less than 5 years	**Between 6 years and 10 years**	**Between 10 years and 15 years**	**More than 15 years**
Amount	3	7	2	7
Percentage	15,8%	36,8%	10,5%	36,8%

Source: elaboration of the authors from the field research (2020).

Regarding the length of service in SEEDF Rural Education, 78% of those surveyed said they had more than 6 years of experience in these schools, which shows that the teachers have considerable experience in rural educational. However, even with high experience, the continuing education of these teachers, focused specifically on the theme of the field is still scarce, given that only 10.5% of those surveyed participated in more than 4 specific courses in this theme; 89.5% took between 1 and 3 courses on Rural Education; only 1 teacher mentioned having a postgraduate course on this topic. In the next

topic (Topic 5), we bring the second part of the analyzes, regarding the open questions of the questionnaire.

6. Analysis and Discussion of Results

We emphasize that for this analysis, the assumptions of Dialectical Historical Materialism were considered, with regard to the categories: historicity, work, mediation and contradiction. Such analytical categories helped us to analyze the phenomena of this research, considering that they occur in the social environment in its various faces, and that they refer to the relationship between man and nature, man and society crossed by their contexts (OLIVEIRA; OLIVEIRA and SANTOS, 2013).

Historicity emerged in the profile of the subjects surveyed with regard to their life stories, experiences as teachers at SEEDF and in Rural Education. To understand this category, we highlight that man is a historical being; his human participation in society, his form of production in the countryside, leads to the materiality of his identity and his individuality, as argued by Marx and Engels (1999, p. 55):

> This conception of history therefore consists in exposing the real process of the material production of immediate life; and to conceive of the form of exchange connected to this mode of production and created by it as the foundation of all history, presenting it in its action as a State, explaining from it the set of different theoretical products and the form of consciousness [...].

The history category made it possible to bring a worldview about the continuing education of teachers in SEEDF rural schools, their challenges and their progress at work.

In relation to the work category, it is anchored in the germ of the epistemology of Rural Education, as it is the locus of performance of the participants in this study. Thus, we understand that in order to analyze the continuing education of these professionals, it is necessary to understand work as the basis of man, in his relationship with society. For us, the researched teachers seek to transform the environment in which they live through work, understanding the meaning of rural education. For this, we ask “what is rural education for you?”

> It is the [...] training offered to the rural community; emerged from social and political movements to promote education in line with residents' values and ideas (P5).
>
> It is education aimed at valuing the community of the countryside, respecting their particularities, singularities; highlighting and making known its culture, economy. It also highlights a close look at the contributions of this community to the urban community. It is the appreciation of this community in terms of cultural, economic and traditions. Teaching aimed at valuing this community, highlighting its importance (P5).
>
> It is education that considers and values the culture of its subjects, stimulating their protagonism (P7).
>
> It is a differentiated education with a more humanized look (P12).
>
> It is education for students who live in the field and that can meet specificities and different realities (P13).

Thus, we verified that a countryside education for "Formation" (P5) is one that aims at the "values and ideas of residents" (P5). In this understanding, we realize that a countryside school does not occur

outside the social reality of the community; You need to link knowledges. After all, what do you know, are we talking about? The land knowledge, in which the "cultural, economic aspects and their traditions" (P5) will not only be indicators for "knowing" and "doing", but also elements of intentionality, so that students are conceived in a mediating relationship, as the protagonists of knowledge. Therefore, they are transformative subjects in making and building a new story in the school of countryside.

From the analyses, we also realized that there is in these teachers the assumption of a humanizing education, in search of emancipation from work. And thus, this category (work) present in this tessitura, is revealed as one that intends to meet the demands of the subjects of the field, that is, going beyond the capital.

However, in order to go beyond this capitalist context, it is important to reflect on geopolitical, economic and cultural constructions in the different federative sectors of governmental and non-governmental nature consolidated by public and educational policies, which translate as legal instruments for the realization of improvements in the development and guarantee of the right to Countryside Education.

This struggle to go beyond capital is corroborated by the "Struggle for Land", which is done through public policies, such as PRONERA (Education Policy in Agrarian Reform), established by Decree nº 7. 352, of November 4, 2010. And from the central objectives designed by the movements of the working class, we propose to the teachers to comment on this public policya - PRONERA:

> I know that it is a program of the Federal Government that supports the causes / struggles for Agrarian Reform (P2).
>
> PRONERA is a public program resulting from the organization of rural workers in the struggle for the right to public and quality education. Through it young people and adults have access to free courses, which directly contributes to the reduction of illiteracy of the peasant community (P6).
>
> Program aimed at the education of workers in the countryside, from literacy to graduate studies, focusing on those who live in settlements (P7).

In the discourses presented, we found that teachers who demonstrated knowledge of PRONERA's policy highlighted its importance as a right to Rural Education and Teacher Training. In the second point, the contradiction category became eminent, emerged in the research data, because this category refers to "[...] an indispensable component for society, because this social reality provided with totality is also contradictory [...] the contradiction is established due to social phenomena that are not solved because of variables (OLIVEIRA; OLIVEIRA and SANTOS, 2013, p. 11).

The contradiction is revealed in the fact that teachers are immersed in Rural Education, but are unaware of one of the main public policies focused on this theme. Of the 19 subjects surveyed, 6 answered that they did not have knowledge about PRONERA, 10 teachers did not answer the question and only 3 reported that they know the policy. The unveiled essence corresponds to the contradiction of the educational field, between theoretical knowledge and practice.

The document Pedagogical Guidelines of Basic Education of the countryside for the public school network of Distrito Federal (FEDERAL DISTRICT, 2019), brings the public policies, as well as the normative frameworks that underlie the Rural Education in SEEDF, one of these legal provisions being Decree nº 7. 352, of November 4, 2010, which concerns PRONERA. We consider it important that this

Decree be known to education professionals, considering that it emphasizes the principles of Rural Education, respect for diversity, in addition to guiding educational institutions to develop specific pedagogical political projects focused on the social movements of the countryside. We consider that it is feasible for schools to promote continued training in service, bringing as one of the theoretical references the Guidelines, as a way to present this document to teachers.

The emergence of the mediation category was shown in the analyses of teachers' responses, with regard to continuing training for rural education, in order to meet the objective of this study: to analyze the Continuing Education of teachers in public schools in Distrito Federal.

Thus, we asked the participants what would be the importance of specific continuing education for Rural Education, that is, for those who work in this locus and whether they perceived advances in this type of training. The teachers highlighted that theoretical knowledge is allied to practice, in order to assist the teacher in the reflection of their methodologies, which need to be taken intentionally to promote meaningful learning, as emphasized by the participants P6 and P10:

> We need to know to apply best practices [..], knowing the reality we can value culture and promote collaborative and meaningful learning. When we know our audience, our daily activities contribute to practical theory relationship. I also believe that learning gains a special meaning. The student recognizes himself in the process. Important to also learn about a new culture (P6).
>
> I think that training changes the way education professionals view education and especially rural education, since this education has unique needs and education needs to be appropriate to those needs. It is important for students who do not have as many stimulus, as those of the city, to learn and stay in their homelands and in these make a difference as citizens (P10).

For Freire (1987), freedom is humanization and takes place in the process between "me and the other". Thus, knowledge cannot be deposited, even because the word is not hollow, empty; it's history and praxis. Because it is praxis, it is done in the action-reflection-action of the subjects with their own world and on it, to transform it. Anchored in this Freiriano thought, training emerges as an element of mediation for teaching work and pedagogical praxis, since, from it, the teacher can adapt their strategies according to the needs and contexts of the students, as P13 highlights "It is important to train professionals who work in this area, to know the specificities of Rural Education to achieve the pedagogical objectives of students". In this sense, Molina and Martins (2019, sp.) point out:

> The right to continued education of educators and educators as part of the requirements for the development of public education of social quality is part of the struggles of the teaching movement for a long time. Documents from the National Association for the Training of Education Professionals (ANFOPE) from the 1990s and 2000s bring important references on the subject. Countryside Education is part of this struggle and defends the right to continuing education condition sine qua non to qualify the teaching practice. The continuous formation of educators, with the permanent institution of times and spaces of theoretical deepening and critical reflection on the practices themselves, is an imperative need for a teaching practice that aims to promote critical and emancipatory educational practices. With the understanding of continuing education as a right and, at the same time, as an obligation of the State to guarantee public policies that promote and effectiveness, the Rural Education, following its materiality of origin, of being

instituting rights, has sought to promote, continuously, spaces of formation of educators and educators who act in it, at different levels of education.

Corroborating the thoughts of Molina and Martins, we believe that the State as a federative body has the duty and obligation to assume its role before education, in such a way that the continued training of teachers in the rural education is not a favor, but a right, provided for in the Laws of Guidelines and Bases of National Education 9,394 of 1996 , in goal 8 of the PDE, and in other policies such as PRONERA. Also noteworthy is the political project of continuing education articulated in the school of the countryside, in which Freitas (2019, sp.) emphasizes that:

> As an interface process of educators in the exercise of their work, it is essential that the theoretical dimension of training is in close articulation with its concrete problems, with the cultural identity of the region where it develops, value the knowledge productions constituted in the teaching work, seeking to develop, in educators, the skills and competencies of researcher in their field of knowledge. Considering the public nature of the profession and the political commitment to the formation of the new generations, continuing education is no longer a matter of decision-making and choices exclusively particular, personal. On the contrary, it must be articulated in a combined way to the needs of basic education and the collective of schools, and also seek to increase the political awareness of professionals in the face of social transformations in continuous movement and the prospects for the future of education, school and profession.

Articulating in a combined way with the structuring axes of the curriculum, respecting the specificities of Rural Education, the teacher is able to develop his teaching practice, based on a cultural identity that values the knowledge of the land. Based on this prerogative, it was important to verify whether schools have offered moments of continuous training in service. SEEDF provides training at EAPE - Subsecretariat for Continuing Education Professionals, as well as in some regional education (CRE's). However, educational institutions also have autonomy to offer training to professionals in times of pedagogical coordination. Table 2 highlights the answers about the moments of continuing education in schools.

Table 2 - Continuing education in schools in the Distrito Federal

Number of responses	Type of training
3	During pedagogical coordination, mediated by EAPE
1	Training by EMATER/DF
3	Thematic school day on Rural Education
3	Speakers invited by the school
1	Annual Meeting of field schools - successful exchanges of experiences
2	Workshops taught by UNIEB/CRE
6	There is no training in my school during the coordinations
Total: 19	

Source: elaboration of the authors from the field research (2020).

According to Table 2, we found that of the 19 participants, 6 reported that there are no moments of training in their schools. This is a worrying reality, considering that training, when carried out reflexively, generates full realization by work to promote a transformative practice, thinking about the social reality

of its students. Thus for Giroux (1997), teachers are transformative intellectuals, in which their pedagogical actions must be constituted from the duo "pedagogical - political" and "political-pedagogical". When teaching practice comes from a transformative perspective, it is perceived that planning, classes, curriculum and school projects not only live, but are born from territoriality, family, work, land, culture, because the subjects of the countryside understand this reality.

> I want a countryside school/that has to do with life, with us/wanted and organized/ and conducted collectively. I want a countryside school/that doesn't just see equations that have as "master key"/work and task forces. I want a countryside school/ that doesn't have fences that don't have walls/ where we will learn to be builders of the future. I want a field school/where knowing is not limited/that we can see the whole/and understand the sides. I want a countryside school/where is the cycle of our sows/which is like our house/which is not like the house of other people (GILVAN SANTOS, 2006, p. 20 *apud* CAMACHO, 2019, sp.).

And for this countryside school to happen, you have to start from the "i" and "we." In this context, continuing education is a foundation in the life of these teachers, as well as the formations mediated by EAPE/SEEDF, workshops offered by CRE – Regional Coordination of Teaching, as well as lectures given by guests who go to schools to talk about Rural Education.

We also ask about the School of the land training course. This course is a proposal of the Ministry of Education - MEC and aims to promote the improvement of the conditions of access and permanence of students in the field, offering support, pedagogical materials and training to teachers who work in this type of context. This proposal is adhering to this proposal by the state, district or municipal departments.

In this way, one of the proposed questions was "Did you know the Land School course? If the answer is yes, write a little about it." Of the 19 teachers participating in the study, 11 did not answer this question, 4 reported that they do not know the course, 2 answered that they "have heard about but have not participated" and only 2 teachers participated in the School of the Land course.

The reality of some schools in the countryside of DF in the area of continuing education is alarming, because we believe that the context of Rural Education has training but there is no complete support, which we think is paramount to promote the improvement of the learning of these students, as well as support to teaching practices. Thus, there are some challenges that are shown in this context, as highlighted in the 13th question of the questionnaire: "In your opinion, what are the challenges encountered for the continuing education of SEEDF rural education teachers today?"

> One of the challenges is the distance between commuting from the workplace to the training site (P3).
>
> There's little offer. There is little disclosure of the importance of the Guidelines of this community, besides the lack of interest of professionals in knowing it (P5).
>
> The physical distance. Generally the courses are outside the Regional Teaching, and often the school is in places of difficult access, which becomes more of a deterrent (P8).
>
> When the training is in the city gets very busy; most schools are far from the urban area, so we need a flexible schedule (P10).

The report on the difficulty of travel and distance was very much addressed by teachers, because when the training sits in the EAPE - center of Brasília/DF, the route is long for those who work in the

schools of the countryside and there is no flexibilization of schedules.

The category contradiction and work are reinvigorated in these discourses, by showing the social, political and cultural reality experienced by thousands of teachers working in Rural Education. It is not only a point to build schools, to establish public and educational policies if there is no viability of access, as well as the provision of the necessary means for teachers to perform these trainings. After all, the journey is long to the institution that offers the courses; it is necessary that this training comes out of the "drawers" and goes to the "school floor", place where teachers are "based" on training. Freitas (2019, sp.) highlights:

> Teacher training must be a process of continuing education, the responsibility of the individual, the State and society. This continuity of the teacher training process must be assumed by the two education systems – state and private – ensuring through own resources the structures necessary for their viability and linking this training to career plans.

The State Department of Education of the Distrito Federal may make agreements with Universities, Federal Institutes. The schools of the countryside can invite teachers (specialists, masters, doctors or training in Rural Education) to teach extension courses, lectures, workshops in collective moments, since these are tools that can enable the relationship between theory and practice. Other focuses of training are: forums, symposia, congresses, seminars, fairs, courses, as well as those offered by the Paulo Freire Training Center, online; TV Fonec that occurs every Thursday at 7 pm, enabling lives through Youtube, with training on Rural Education. Also noteworthy is the training by Anfope Nacional, every Monday at 17 hours, with lives (Youtube) on teacher training; Web TV Undime Bahia live on education. Finally, in addition to training by SEEDF, the field teacher will be able to take other courses, even online.

And so, in a broad view of the materiality of Rural Education in the context of training, we asked the participants: "How do you summarize the importance of rural education for countryside subjects?" The answers fell into four categories: learning, individuality, valorization and permanence. The teachers emphasized that the education of the countryside is important to value the subjects of the field, since specific public policies are necessary to ensure the access and permanence of these students, as P7 points out: "It is necessary to provide learning to students from these locations, in addition to conditions of access and permanence for them to carry out their studies".

Therefore, for the valorization of the subjects of the countryside, the data showed us that it is necessary to provide learning, taking into account the individualities of the students in their context, promoting not only access to the school, but also their permanence; in this sense, we think that training can lead the teacher to reflect on this appreciation, providing his intentional practice, since training is not only acquisition of knowledge, but rather a reflection of his pedagogical action.

7. Final Considerations

The study allowed us to have a different look at the subjects of the countryside, since understanding the formative context of Rural Education in public schools in DF helps us to reflect on what is the best way to promote and develop continuing education that is aimed at valuing and transform the educational

environment, providing students with learning according to their individualities.

In the materiality of the analyzes, it was possible to verify that the specific training for the countryside in SEEDF needs to advance; both in relation to training schools (EAPE) and in-service training, during times of collective coordination.

We also highlight the need for teachers to disseminate and learn about the laws, public policies and guidelines on rural education, reflecting on what has been innovated in this regard and what the impacts of this knowledge are on the practices and strategies of teaching.

Moreover, it was possible to understand that the need for training does not only concern theoretical knowledge, but rather the possibilities of having initiatives and changes in teaching strategies, so that they are mediated and focused on inclusion, valorization of the student in the field and that they are not only merely reproductive practices in the classroom.

It becomes notorious that The Education of the countryside has been walking and building its space within the scope of public educational policies, which has in fact been increasingly strengthening so that the subjects of the countryside receive their rights, which translate into a dignified and quality education.

It is noteworthy that 22 years after the birth of Rural Education in Brazil, we observed that social movements, through the class struggles of workers, rooted by advocates of an education "in and from the countryside", work in order to enable freedom and human emancipation for the peasant. Thus, they were during these two decades, building Forums, Congresses, as well as fights and classical works of literature focused on the countryside. We can highlight some of great relevance, such as:

a) Dictionary of Rural Education, Roseli Caldart, Gaudêncio Frigotto, Isabel Pereira and Paulo Alentejano;
b) For an Education of the Countryside of Miguel Gonzalez Arroyo, Roseli Caldart and Monica Castagna Molina;
c) Education of the countryside as a human right, by Ângela Monteiro Pires;
d) Rural education: proposals and practices, by Maria Antonia de Souza;
e) Contributions to the Construction of an Education Project of the Countryside of Monica Castagna Molina and Sonia Meire Santos;
f) Rural Education and Vocational Training: The Experience of the Agrarian Residency Program of Mônica Castagna Molina, Gema Galgani S. L., Esmeraldo Pedro Selvino Neumann and Sonia Maria P. P. Bergamasco;
g) The Production of Rural Education in Brazil: From Historical References to the Institutionalization of Cecilia Maria Ghedini;
h) Memory and History of PRONERA: Contributions of the National Program of Education in Agrarian Reform for Rural Education in Brazil by Clarice Aparecida dos Santos, Mônica Castagna Molina and Sonia Meire dos Santos Azevedo de Jesus.
i) Educational territories in the education of the countryside: School, community and Social movements of Aracy Alves Martins, Maria de Fátima Almeida Martins and Maria Isabel Antunes-Rocha.
j) Census Journal - Educational Studies of the Distrito Federal
k) Brazilian Journal of Rural Education - UFT

l) EAPE Magazine - Continuous Information;
m) Brazilian Journal of Agroecology;
n) Training in Motion Magazine - ANFOPE;
o) Brazilian Journal of Basic Education - UFMG

Thus, the continuing training of teachers for the context of schools in the countryside of the Distrito Federal, is paved by a literary framework, in addition to an academic collegiate of Universities, who seek to take this training together with the Department of Education of the Distrito Federal. However, for this, it is of paramount importance that teachers and schools come to meet knowledge. It is noticed that EAPE has become one of the largest fronts of teacher training of SEEDF. In this sense, we believe in the importance of training more professionals and bringing this intentionality to "the school floor", because reflexive practices can lead to improvement in learning.

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Historical context of nursing professionalization in brazil: a journey into the past

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Abstract

The objective of this study is to describe the historical context of nursing professionalization in Brazil. In the middle of all this process, nursing has been developing in Brazil since the beginning, facing several challenges, in an attempt to consolidate itself as a profession. It is an exploratory and descriptive study, that uses as instruments of theoretical foundation the bibliographical and documental research. The study makes a rescue on how nursing has been consolidating with the passing of centuries, registering the appearance of nursing in the country, pointing still as the professionalization of nursing happened in Brazil, as well as the main legislation referring to this context. When reflecting on the history of nursing and its development, it becomes possible to recognize the profession and the challenges faced, allowing problematize the past of nursing.

Keywords: Nursing; History of Nursing; Education, Nursing.

1. Introduction

Oguisso (2001) states that studying history is of fundamental importance to discover paths taken by past generations and to understand the reasons that motivated the choice of certain paths, which may have repercussions on present circumstances.

During all this process, nursing has been developing in Brazil since the beginning, facing several challenges, to consolidate itself as a profession. A professional category indifferent to the compression of its past and history, has difficulty in building its future, because the valorization of this historical context allows a better foundation of nursing.

The objective of this research is to describe the historical context of nursing professionalization in Brazil, helping to understand its emergence in the practice of caring, as well as providing an overview of the general overview of modern nursing and its main representatives. It is an exploratory and descriptive study, which uses as theoretical basis the bibliographic and documental research, collecting materials and documents (books, papers, theses, dissertations, legislation and other official documents) previously elaborated to discuss the history of nursing, based on renowned scholars of the area such as Oguisso (2007), Oguisso, Campos and Moreira (2011), Geovanini (2010) Stutz (2010), among others

The study is a valuable element for the understanding of this process, because it makes a rescue, about how nursing has been consolidating over the centuries, registering the emergence of nursing in the country, pointing out how the professionalization of nursing happened in Brazil, as well as the main legislation related to this context.

2. The emergence of Nursing in Brazil

During the colonial period, health actions were initially linked to the mysticism and customs of the shamans and sorcerers in the tribe itself, as well as to domestic practices carried out by indigenous women for the care of the elderly, children, and sick people (GEOVANINI et al., 2010).

The situation in medicine was dramatic, and even more so in the care and assistance services for the

sick. The majority of sick individuals were under the responsibility of their own families, in the figure of the "mother"; or of initiatives of the charitable institutions of the time, such as the Santa Casas de Misericórdia and religious orders, following the Portuguese model (KLE/TEMBERG; SIQUEIRA, 2003).

In 1549 the first Jesuits arrived in Brazil. They docked in Bahia and then went to the south, north and interior of the country. One of the pioneers and most dedicated to catechesis was José de Anchieta (1534-1597) who arrived in Brazil in 1553. In his writings, there is information that makes it possible to survey the nosological picture of Brazil at the time (GEOVANINI et al., 2010).

Santa Casa de Misericórdia de Santos was the first Brazilian hospital created in 1543 by Brás Cubas. In this hospital, sick people were cared for by religious of the Society of Jesus or the Jesuit Order, created in 1534. In the XVI and XIX centuries other Santa Casa de Misericórdia were created such as: São Paulo (1560) this one reformed and finished in 1884, Minas Gerais (1735), Santa Catarina (1789) and Angra dos Reis (1824), Juiz de Fora (1854), respectively. There are no relevant records about how nursing was practiced in the first Santa Casa de Misericórdia, however, it is supposed that the Jesuits were responsible for the general nursing works, making themselves assistants for the indigenous and enslaved Africans, to whom they taught how to take care of the sick and other crafts around their own care like cleaning, order, among others. This scenario is portrayed until the 18th century (OGUISSO; CAMPOS; MOREIRA, 2011; FRANCO, 2014; COMERALATO, 2003).

During the 19th century, changes in the economic and political scenario in Brazil had direct implications on the health sector. The frequent occurrence of epidemic diseases in the country hindered the negotiation of Brazilian products, which were destined for export. This situation led to a policy of control of these epidemic diseases, the need for trained and prepared professionals to provide care, sanitary surveillance of ports, and attention with teeth. And it is in these circumstances that the institutionalization of nursing education in Brazil occurs (KLETEMBERG; SIQUEIRA, 2003).

The most prominent name among the precursors of Brazilian nursing is Anna Justina Ferreira Nery, daughter of Luisa Maria das Virgens and José Ferreira de Jesus. Anna Nery was born on December 13, 1814, in Cachoeira, and died in 1880. When Brazil entered the Triple Alliance, together with Uruguay and Argentina in 1865, Anna Nery's children left to serve in the war against Paraguay. On that occasion she wrote a letter to the President of the Province of Bahia, Manuel Pinto de Souza Dantas, offering to serve the war wounded. On August 13, 1865, Anna Nery embarked for the battle fields, and even with the death of her eldest son and a nephew, Anna Nery continued to act in the war with the wounded, making her home in Asunción a shelter for them. She returned to Brazil in 1870 and was received with many tributes and recognition (OGUISSO; CAMPOS; MOREIRA, 2011; CARDOSO; MIRANDA, 1999).

Cardoso and Miranda (1999, p.341) highlight one observation: in relation to Anna Nery's request to participate in the war, her appeal is fundamentally affective and personal. "It is hard to believe that a widowed woman, after twenty-one years of solitary dedication to the care of her children, faced with the threat of losing them during the war, made a request to accompany them for patriotic reasons. However, it is still relevant Anna Nery's performance in front of the nursing profession

3. The professionalization of Nursing in Brazil

In November, 1852, the Hospice Pedro II was inaugurated in Rio de Janeiro, linked to the Santa Casa de Misericórdia. The Daughters of Charity of St. Vincent de Paul also worked in this institution. However, the end of the 19th century brought several socio-political changes, and with the Proclamation of the Republic in 1889, there was the segregation of the State and the Church. Decree No. 142 of January 11, 1890 dismembered the Hospice of the Santa Casa de Misericórdia, changing its name to Hospício Nacional de Alienados (MOREIRA; OGUISSO, 2005).

In the first republic (1889-1930), Brazil was governed by the oligarchies of the richest states, especially São Paulo, Rio de Janeiro and Minas Gerias. (BERTOLLI FILHO, 1996). In 1890 the departure of the Sisters of Charity from the Hospício Nacional de Alienados caused a crisis: there were no people to take care of people with mental disorders. Then the doctors and/or psychiatrists took the initiative to find a school that could prepare individuals to care for the sick (MOREIRA, 2007).

Despite the precarious conditions for the operation of that hospital and for the assistance that was carried out by unqualified personnel, the idea of creating a school to prepare the nursing staff not only for the Hospício Nacional de Alienados, but also for the military and civilian hospitals of the newly installed Republic emerged. According to the above mentioned, this idea was realized by Marshal Deodoro da Fonseca, head of the provisional government of the Republic, who through the Decree n. 791/1890, of September 27, founded in the Hospício Nacional de Alienados the "Professional School of Nurses and Nurse", being officially instituted the nursing teaching in Brazil (MOREIRA, 2007; MONTEIRO; OGUISSO, 2015), as well as the preparation for the professional to exercise a public position and the obtaining of more specialized knowledge, something that guarantees the accessibility of a new job market and also retirement after a certain period of service.

The Escola Profissional de Enfermeiros e Enfermeiras is currently called EEAP – Escola de Enfermagem Alfredo Pinto, belonging to the Universidade Federal do Estado do Rio de Janeiro - UNIRIO. The training methods of this school were the same as those established at the Salpêtrière Schools in France; the course lasted 2 years, and its curriculum dealt with basic aspects of hospital care, predominantly curative (GEOVANINI et al., 2010). Stutz (2010) highlights that the profile of the student admitted to nursing school was focused on the less favored social classes. The social elite of the period were not interested in any of these services of lodging, food and much less monthly gratuities, because all of this already possessed - and much more - and it was also not interesting to provide services that they considered inferior.

In 1894 the Hospital Samaritano was founded in São Paulo, because of the efforts of men and women from the evangelical community, foreigners, and Brazilians, mostly living in São Paulo. The nursing activities were carried out by foreign nurses, mainly English. From the year 1896 on, the institution began to receive students in boarding school. This course is considered the first in Brazil to adopt the nightingalean teaching system (OGUISSO, 2007). That same year private institutions joined this official government effort, creating schools and open courses, such as those held by Hospital Samaritano, in the city of São Paulo; this task was joined by the Brazilian Red Cross - Branch State of São Paulo, in 1912.

This same school, in 1914, offered a course for volunteer nurses, and in 1916, a course for professional nurses, both in the city of Rio de Janeiro (OGUISSO; CAMPOS; MOREIRA, 2011).

The Regulations of the General Hospital of the National Public Health Department (NPHD) were approved by decree nº. 15,799, november 10, 1922, and provided for the foundation of the nurses' school of this Department. Geovanini, et al. (2010) report that the Rockefeller Foundation Commission (1915) belonging to the International Health Board (IHB) received a request for financial support from Carlos Ribeiro Justiniano Chagas, then director of DNSP, to contribute to the project of organizing the Public Health Nursing service in Brazil, under the supervision of American nurses. In December 1923, one year later, decree nº 16,300 of 31/12/1923 in fact regulated the school for nurses in this department, now called Anna Nery Nursing School, of the Federal University of Rio de Janeiro (UFRJ) (FREITAS, 2007).

The Anna Nery School of Nursing has resized the model of professional nursing in the country, following the standards set by the nightingalean model. By choosing for its higher social classes, with the help of a policy interested in supporting the development of the profession, it became the standard for the other schools, directly serving the project then established (GEOVANINI, et al., 2010).

In this school Anna Nery, most of the candidates were upper middle class girls, because two of the requirements were: to know how to read and write, and to present a certificate of good morals; characteristics related to the desired profile, being several of them recruited by sanitary doctors from NPHD. By determining the ideal woman "with basic knowledge and in accordance with social norms, doctors kept the "illiterate employee" away from the work of health institutions, while they favored women of "good custom," granted by private coexistence and adequately socially approved for circulation in public environments (SANTO, 2012 p.313)

Decree nº 20,109 was enacted in 1931, establishing the Anna Nery Nursing School as the standard official school for teaching in Brazil. In other words, from that moment on, nursing schools, official or private, that wished to be equalized, had to meet basic requirements, in the model of the standard school, which included everything that concerned the direction, the conditions for entry, the duration of the course, the composition of the program and the conditions of the hospital itself for the practical teaching of nursing. The purpose of this determination was to ensure a high level of professional training of nurses in Brazil (MONTEIRO; OGUISSO, 2015).

It is necessary to highlight in 1926 the foundation of the National Association of Brazilian Nurses, today, the Brazilian Association of Nursing (BAN), was held by the first nurses trained at Anna Nery School. In 1928, this organization was legally registered and affiliated to the International Nursing Council in July of the following year. This entity aims to bring together nursing professionals, among them, nurses, obstetricians, technicians, nursing auxiliaries and nursing academics; promoting the technical-scientific, cultural and political development; enabling research and exchange with other national and international organizations, in addition to disseminating the nursing activities (FREITAS, 2007).

Law nº 775, of August 6, 1949, was the first legislation to be passed on nursing education in Brazil. According to the law, the Nursing course should last 36 months, and the nursing assistent course should be held in 18 months, in addition to requiring that Nursing education be centralized in university centers. According to art. 5º of this law, to be able to enter the nursing course, the applicants, from then on, should

present the certificate of conclusion of the secondary course; and for the nursing assistent course, the certificate of conclusion of the primary course (MONTEIRO; OGUISSO, 2015).

Then, the law nº 2.604, of September 17th, 1955, dealt with the exercise of nursing, determining the categories that could act in this profession: nurse, obstetrician, nursing assistent practical nurses or midwives. At that time, there were several categories within nursing, such as practical nurses, practical nurses, nursing assistants, military nurses, attendants and so many other names (FREITAS, 2007). With law nº 2995/56, all nursing schools began to require full secondary education or equivalent from their candidates, however, only in the following year did Nursing begin its steps toward higher education (GEOVANINI et al; 2010).

Matsui, Cruz e Oguisso (2015, p. 49) report in their researches on the legislation that "Law nº 4.024/61, first Law of Directives and Bases of National Education (LDB), the Ministry of Education organized the teaching of Nursing, having in mind that until that moment the courses and schools were created in isolation". According to the authors, the aforementioned law established that high school would be offered in two cycles (elementary education and high school), including, among other courses, those of technical formation. The principle of high school technical education was to attend the following areas: industrial, agricultural and commercial, in which nursing was not covered. Based on this law, it was established that those high school technical courses that were not specified there would be regulated by the different education systems, i.e., the state education departments.

Oguisso (1977) states that, since the 1970s, the legislation on the nursing assistant course, regulated by Law nº 775 of August 6, 1949, had been going through successive changes, confusing the directors of the schools or courses, or forcing them to continuous adaptation. In the Anna Nery and Luiza de Marillac Nursing Schools, the technical nursing course was instituted in 1966, through the crafts of the Federal Council of Education 171/66 and 224/66, respectively. The courses in both schools were operated on the basis of their own legislation, disconnected from the national education system.

The Federal Council of Education instituted the intensive nursing assistant course in 1970, through the craft 75/70, in eleven months of duration, determining as a requirement for the admission of candidates the minimum age close to 18 years and the completion of the gymnasial course. However, even before this new system could be implemented and effective by some schools and could be evaluated, a new teaching law was passed on August 11, 1971, 5,692, which once again modified the nursing assistant course system, establishing the guidelines and bases for teaching 1st and 2nd grades. With so many uncertainties, at that time the author already asked: "Is there a distinction between the nursing assistent and the nursing technician? (OGUISSO, 1977, p. 173).

On July 12, 1973, through law n. 5.905, the Regional Nursing Councils (CORENs) were created, entities of inspection of the professional exercise of nursing, at federal and state levels. According to the precepts of this law, the Federal Council of Nursing (COFEN) organized three different boards for registration: board I (nurses), board II (technicians), board III (nursing assistants, practical nursing and midwives) (FREITAS, 2007).

At the end of the 1970s, Brazil suffered the effects of an international crisis in the capitalist world, characterized by restrictions on social policies in the face of reduced financing caused by the recessive economic crisis. The crisis was not limited to the imbalance between expenses and revenues, but arose

from a series of political actions, strongly evidenced by growing unemployment, decrease in the real value of salaries, fraud against the social security system, low public sector assistance coverage; growing health care spending through the inclusion of new technologies; and by a predominantly individual and curative health model (PEREIRA et al., 2009).

Barros and Herold Júnior (2013) point out that, as far as education is concerned, the 1980s were strongly marked by debates regarding the recreation of the Brazilian public and democratic educational system, where the negotiation process demanded the increase of the possibilities of access to basic education, and it was the responsibility of the public power to offer it in a free and equal way to all Brazilians. Still, the plan of assistance of the nursing work, "is given in a way to subsidize the medical attention. This is related to the technical and social division of work, being the responsibility of this agent to do it intellectually and the other workers to do it technically and directly" (PEREIRA et al., 2009, p. 773).

Freitas (2007) states that only in Law nº 7.498, of June 25, 1986 (with regulating Decree nº 94.406, of June 8, 1987), is that each nursing category is discriminated according to its specific attributions, including that of the nursing technician. In this way, art. 7 highlights who are the nursing technicians and art. 12 determines which are the activities of their competence. The nursing actions were classified in complex and elementary activities for the first time.

The Law that deals with the professional exercise of nursing in Brazil is n° 7.498, of June 25th, 1986, regulated by decree 94.406 of June 8th of the following year (BRASIL, 1986). Some articles of the aforementioned law were vetoed and, in addition, there were other devices that had not been included, such as some bold devices that the nursing leaders of the time tried to assure the nurses (OGUISSO, 2001).

According to Barros and Herold Júnior (2013), the ideas discussed in the 1980's, as previously explained, were accepted by the 1988 Constitution and then defended by LDB no. 9,394/96. With this new LDB, basic education became three levels: early childhood education, elementary school and high school. In relation to the development of professional education at the secondary level.

Within this legal framework, the schools that offered nursing courses sought to adjust the curriculum of the technicalnNursing and nursing assistent courses. Those institutions that kept only isolated courses of nursing assistant, needed to install the professional qualification of technician in nursing. The professional qualification courses could only be offered by educational institutions that had the respective authorized technical professional qualification. Thus, the courses were organized in two stages: the first (or 1st module) corresponds to the professional qualification, offering the nursing assistant certificate, and at the end of the 2nd stage (or 2nd module), corresponding to the professional qualification providing the nursing technician diploma (MATSUI; CRUZ; OGUISSO, 2015).

The COFEN Resolution 276/2003 established the maximum period of five years for the authorization of provisional registration in COREN, for nursing assistent. According to this resolution, the Nursing assistent does not receive from that agency the definitive registration to act in this professional category. The concession is offered and effected by the council, in case the individual proves that he is giving continuity to the studies for Habilitation in Technician in Nursing, or still, taking the graduation in nursing (CAVERNI, OGUISSO, 2005).

Stutz (2010) also mentions that historical records show a common problem for nursing schools in Brazil, which still persists in the daily life of many of them: the teaching of nursing requires learning beyond the classroom content, experiences provided in the daily routine of health institutions, especially hospital institutions. In this way, there is the need to conquer a space for insertion and reception of nursing students in the routine of hospital institutions, which becomes, many times, a challenge for educational institutions in the area (STUTZ, 2010).

As a profession, it is fundamental that nursing has strong entities, so that it can be represented in society with legal and ethical apparatuses for professional exercise; as a field of work in the health area, it needs to defend a model of work organization that also takes into consideration the population's right to health that allows the expression of subjectivity and creative pleasure at work, considering the multiple subjects, with individual and cultural differences, who are involved in collective work in health (PIRES, 2009).

4. Conclusion

The history of nursing has as purpose to explain the lived situation and to make possible a way of perception about all this process. When reflecting on the history of nursing and its development, it becomes possible to recognize the profession and the challenges faced, allowing to problematize the past of nursing. This study has an immeasurable value for the historical rescue of the professionalization of nursing in Brazil, which involves not only the history told through laws, resolutions or other physical documents, but also the experiences of those who made this history happen, corroborated with authors of literature.

5. Acknowledgement

The research had no funding

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Analysis of Intellectual Property Assets in A Local Innovation System on The Rise: The Case of Pernambuco

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Abstract

The intellectual protection process is a sine qua non condition for leveraging a system based on a specific location. The purpose of this article was to find a referenced chronological survey - 2000 to 2017 - on the relationship of fostering innovation and Intellectual Protection, according to the usability of certain assets in view of the Local Innovation System in Pernambuco - Brazil. The methodology used was descriptive, with documentary analysis and bibliographic references. As a result, it was found that there is a structural disorder in Intellectual Property in the state, taking it to levels far below other Local Innovation Systems with the same innovative maturity. A developmental and intellectual property gap was found in what is already considered one of the largest and best structured Brazilian Local Innovation Systems. Considering these unsatisfactory results, it is necessary to promote in the Pernambuco Local Innovation System innovative matrix methods and Intellectual Property capable of taking the referred state to innovative levels never thought of.

Keywords: Local Innovation System, Intellectual Property, promotion.

I. INTRODUCTION

1.1 Innovation

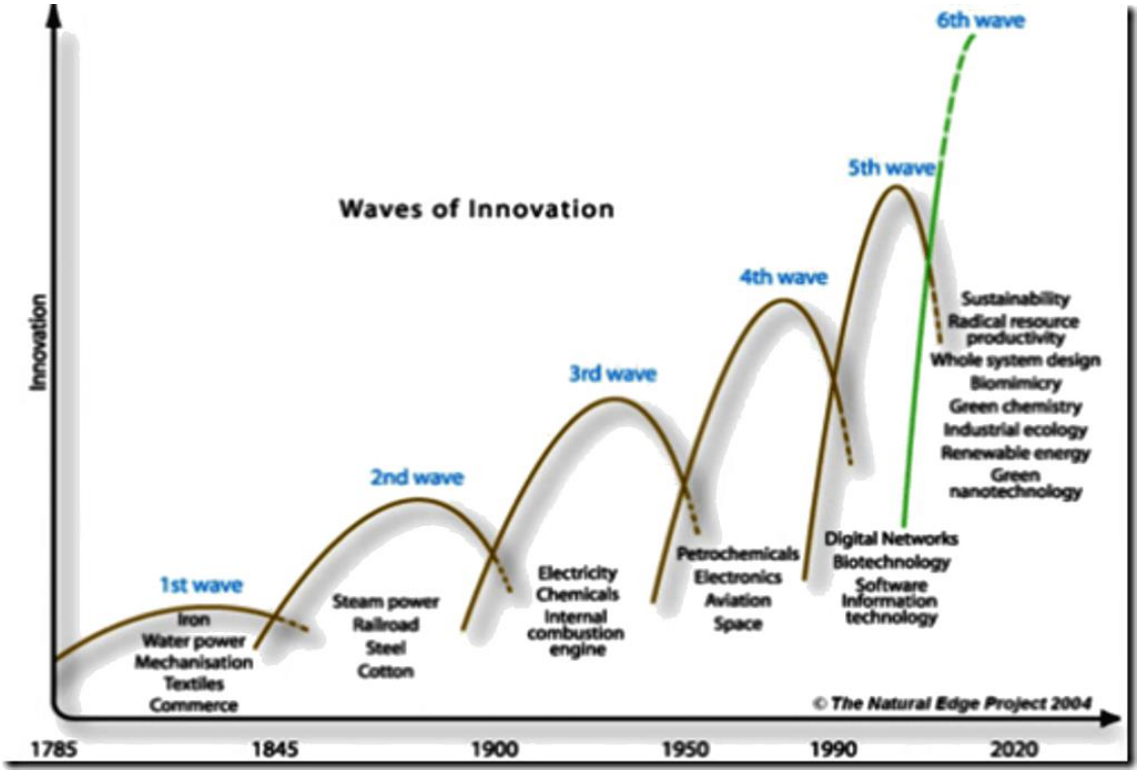
The process of maturing local innovation ecosystems permeates important areas and makes a particular location a precursor to innovation and development in a given region. As a general objective, this manuscript intends to demonstrate a chronological survey - 2000 to 2017 - on Intellectual Property assets - PI and the relationship of fostering innovation and Intellectual Property, according to the usability of certain assets in relation to the Local Innovation System Pernambucano.

Intellectual property protects all assets developed based on good ideas from entrepreneurs inserted in Ecosystems. Many authors are developing concepts about innovation and innovation ecosystems worldwide, see: The conception of innovation as the result of an interactive process of accumulation of institutional knowledge has its roots in experiments that were initiated and carried out in England, at the

University of Sussex, conducted by Professor Chris Freeman, and in the United States, at Yale University, who "demonstrated the extreme importance, for innovation, of the accumulation of internal skills, fundamental for companies to interact with the external environment"(CASSIOLATO; LASTRES, 2005, p.35). According Freeman (2005) Lundvall (2001); Nelson & Winter (2005), the concepts of innovation were discussed by the Austrian Economist Joseph Schumpeter. From these discussions and, based on their concepts, the Neoschumpeterian School of Economic Thought originated. One of the first authors responsible for the insertion of the concept of innovation is Joseph Schumpeter, who is known as the author responsible for inferring that the activities that lead to cycles of expansion and chartering of the capitalist system and of the organizational processes justify the success or failure of the innovative processes. Schumpeterian Theory explains that the long cycle of study focused on organizational innovations has its main role as an inducer of economic growth. Schumpeter safeguards that competition funnels the entrepreneur's desire to seek new ways to increase technology, new ways of doing business and other types of competitive advantages that could increase profit margins and directly impact the entrepreneur's standard of living. (SCHUMPETER, 1997). Schumpeter also infers that Schumpeterian dynamics has a dialectical character, the boom brings with it the elements that will cause a rupture in the technological pattern hitherto in force, make companies or even entire segments obsolete and lead the economy into recession. On the other hand, new waves of innovations appear and negate the old paradigms of the technological standard, initiating a new cycle of prosperity.

According to the quote above and, taking into account the figure below, it is notorious to realize that there are several types of innovation and that these disruptions occur within the innovative processes in innovative waves / layers.

Figure 1 - Schumpeterian Waves of Innovation



Source: Adapted. Schumpeter, 2015

The figure above leads us to believe that local innovation products / processes / systems go through innovative cycles. The useful life of a cycle is fed back from a new innovative paradigm of the period that is about to start, that is, thatbold prerogatives that a company can face in the midst of national crises and innovative strategies can indicate the direction taken through bold dynamics, capable of fostering innovation and standing out in traditionalist environments.

1.2 Intellectual Property

Scientific and technological innovation gained a protective asset capable of generating resources for the subject to safeguard his inventions. The concept of Intellectual Property in Brazil it has its origin in the initial framework of intellectual property, through decree no. 635, of August 21, 1992, whereby the country adopted international agreements that allowed Intellectual Property to have a unique title in global terms, namely Trademarks and patents (Law No. 9279/96), Cultivars (Law 9456/97) and Copyright (Law No. 9610/98). This is a movement to position Brazil on the international stage, with implications for world trade. International conventions and agreements, such as TRIPS (Trade Related Intellectual Property Rights) are decisive in this new positioning (RUSSO, 2016). The recognition of Brazil and the conception of the aforementioned decree inserted the country in a unique situation, capable of making businessmen / entrepreneurs - owners and, strategically, effective intellectual property assets - able to preserve their businesses, in order to enjoy only innovative products / services / processes. Also in line with the understanding of Intellectual Property, the concept of patents runs through relevant indicators to assess the country's ability to transform scientific knowledge into products or technological innovations (Ministry of Science, Technology [s, d], these can be used as a knowledge base for both acquisition and technology transfer. *(SANTOS, et al, 2014).* The merit of Intellectual Property in the world was assessed in the Paris Convention for the protection of Industrial Property (1883) and in the Berne Convention, for the protection of Literary Works and Artistic Works (1886), the two administrative treaties being validated by the World Health Organization. Intellectual Property - WIPO (WIPO, 2016). Second HUDSON and MINEA, 2013, The World Trade Organization (WTO), along with other international institutions, has been emphasizing the crucial role of Intellectual Property Rights (IPR) as a catalyst for innovation and economic-cultural development worldwide. It starts from the assumption that Local Innovation Systems need to have a greater understanding of Intellectual Property assets - IP, capable of working policies to protect what is generated, innovative and proposed as protection to intellectual knowledge.

1.3 Innovation Ecosystems

There are several authors discussing the concept of Innovation Ecosystems. One of the first concepts related to the theme is TEIXEIRA, TRZECIAK & VARVASKIS, 2017.The authors consider that a Local Innovation Ecosystem infers that the concept is the same that leads to reflections and comparisons with the concept of biological ecosystem. A biological ecosystem can be defined as a set formed by the interactions between biotic components, such as living organisms - plants, animals and microbes - and abiotic components, chemical and physical elements - such as air, water, soil and minerals Still for TEIXEIRA, TRZECIAK & VARVASKIS, 2017, *Biological Ecosystems refer to complex sets of relationships between living resources in an area that aimed to maintain a state of sustainable balance. Innovation Ecosystems,*

in turn, are responsible for shaping the economy, instead of complex biological relationships, and their functionality is linked to the viability of the development of innovation, with social repercussions. As an important part, this manuscript intends to carry out a thorough survey on the promotion of innovation and IP assets for a rising local innovation system. It starts from the premise that the Local Innovation System - SLI Pernambucano, being very developed and internationally recognized, can use this knowledge to protect its technological and entrepreneurial innovations through Intellectual Property assets.

1.4 Pernambuco's Innovation Ecosystem.

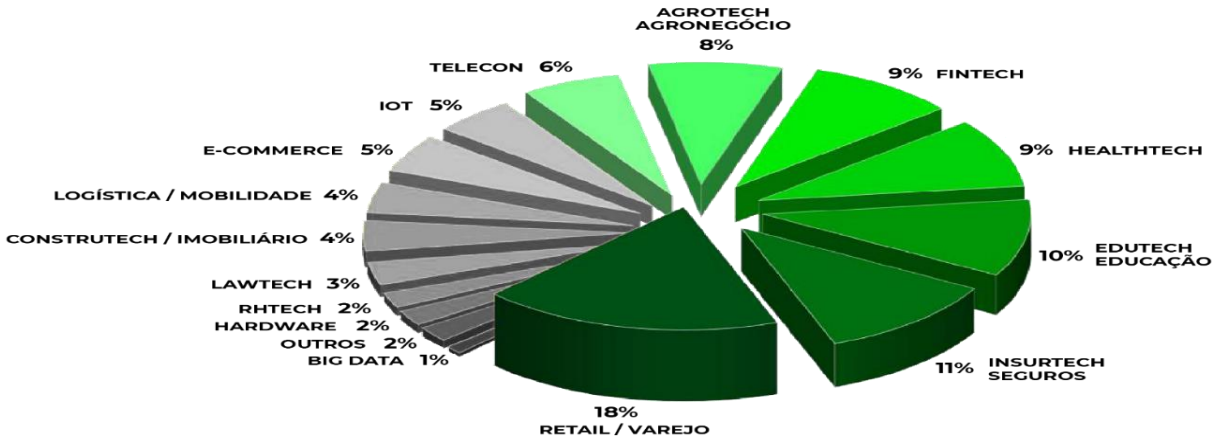
The grandeur of Recife's local innovation ecosystem is notorious with the implementation of Porto Digital. Created in 2000, the park arose from the need to implement a public policy for the development of the Information Technology and services sector in Pernambuco. After its inauguration, Pernambuco felt the need to have a new agenda for the state. Like this, businessmen, members of the academy and representatives of the public sector decided to take to the state government the idea of creating a public policy for the Information and Communication Technology (ICT) sector that would link actors, companies and organizations that until then acted independently and in isolation (PORTO DIGITAL, 2017).

In this sense, the state government obtained an investment of around 33 billion - which was the amount needed to support the base of the Technological Park. The private sector - particularly Telecommunications - made an investment of R $ 1 million in structures and other private companies contributed more than R $ 10 million. It was enough to leverage the developmental culture of the state of Pernambuco. In addition to the entire financial and cultural apparatus, the Technological Park also has the Recife Center for Advanced Studies and Systems - CESAR, a private innovation site and several branches spread throughout the Brazilian territory. Porto also has CESAR Scholl, the set of companies that are part of Porto Digital had revenues of approximately R $ 1.7 billion in 2017. The Technological Park today brings together more than 9,000 highly qualified professionals, 800 of whom are entrepreneurs. Porto Digital has already attracted dozens of companies from other regions of Brazil do Recife, in addition to several multinationals and technology centers. Now, with the territorial expansion to the neighborhood of Santo Amaro, Santo Antônio and São José and the interior of the State, the expectation is that by 2020 around 20 thousand people will work in companies embedded in the technology park (PORTO DIGITAL, 2017).

The last survey carried out by the organization Desenvolve.al and Ecosssitemas.PE, 2020, which aimed to get to know the companies that are part of the Pernambucano innovation ecosystem, points out that, according to Pierre Lucena, president of Porto Digital, “The Ecosystem.PE it will serve as a starting point for participation in open innovation and matchmaking programs, as well as other actions offered by the main actors of the hubs. After all, in addition to being a tool for the ecosystem itself, it is also a portfolio of what we, as a technology hub of national and international relevance, can offer. "

The referred document (2020) identified a number of 190 technology companies and Startups; 25 Research and Development Centers, 23 Junior companies, 11 coworkers and 7 business incubators, in addition to 3 accelerators in the state of Pernambuco. (Pernambuco Ecosystem Innovation Mapping, 2020). This number only leads one to believe that there is a growing maturity of the referred SLI, capable of strongly boosting the solidification of the bases that form its ecosystem. Let's see where the technology companies and Pernambuco Startups are located:

Figure 2 - Startups and Technology Companies in Pernambuco



Source: /// Mapping the Pernambuco Innovation Ecosystem, 2020.

It is clear in the figure above that the Pernambucano Ecosystem is diversified with service, products and processes, capable of making this location the largest ecosystem in the country. It is necessary to analyze whether or not there is innovation in these products, services and processes and whether such inputs are protected by intellectual property assets.

Still in the state of Pernambuco, there is Porto Digital, with tentacles - Advanced Units - in several municipalities, among which, a large develop mentalist municipality in the state - Caruaru. The municipality of Caruaru is a rural region in the state of Pernambuco, 135 km from the capital (SANTOS, SCHIMIDT & ZEN, 2016). According to the Brazilian Institute of Geography and Statistics - IBGE, 2016, the municipality of Caruaru is focused on services and there is an estimate that the sector has an investment of 82% of the municipality's annual GDP at the expense of 17% of the industry against just 1% of Caruaruense agriculture. According to the State Agency for Planning and Research of Pernambuco - CONDEP FIDEM, 2016, the city of Caruaru has an estimated GDP of R $ 3.87 billion, the fifth largest in the state, with 315 thousand inhabitants, with an estimated 27.5% of the population being employed. Armazém da Criatividade is an innovative hub from Porto Digital, located in the city of Caruaru and whose main objective is to foster the development of the ecosystem for the development of creative economy Startups, allowing experimentation, prototyping and exchange of ideas among entrepreneurs (SANTOS, SCHIMIDT & ZEN, 2016). The Armazém da Criatividade de Caruaru opened its doors in 2015 and performs, excellently, its functions in order to leverage and develop the local innovation ecosystem of Caruaruense. It is assumed that a Local Innovation System must have several attractions so that its actors can think about strategies and develop them, in order to positively impact the locality, as well as use Intellectual Property assets taking into account the promotion of SLI Pernambucano.

II. Materials and methods

2.1 Methodology

Methodology is the logical branch / mechanism of recognized rules for performing a search. In this manuscript, the method used to carry out this research was descriptive, through a bibliographic and

documentary survey of various events related to the state's innovative development, in addition to works on the Local System of Innovation and Intellectual Property.

III. Results and Discussion

3.1 Patent Analysis of Pernambuco's Local Innovation System.

The process of granting a patent takes a relatively high average time to the detriment of innovation and commercialization of a product / process / service. For a rising ecosystem, it is necessary that most of the actors involved in the community have knowledge and practice the Intellectual Property assets - PI, capable of promoting and being responsible, nowadays, for most of the value generated by modern companies, especially in the more dynamic segments, those referring to products differentiated by brands and other badges, design and technological or authorial content. (BOLETIM RECIFE, 2015). Below, we will discuss the number of Brazilian States with the greatest representativeness in the total number of patent grants in the period between the years 2000 to 2012, according to the Bulletin of Indicators in Science and Technology and Innovation: Patenting Activities in Brazil and in the State of Pernambuco, Recife, August 2015

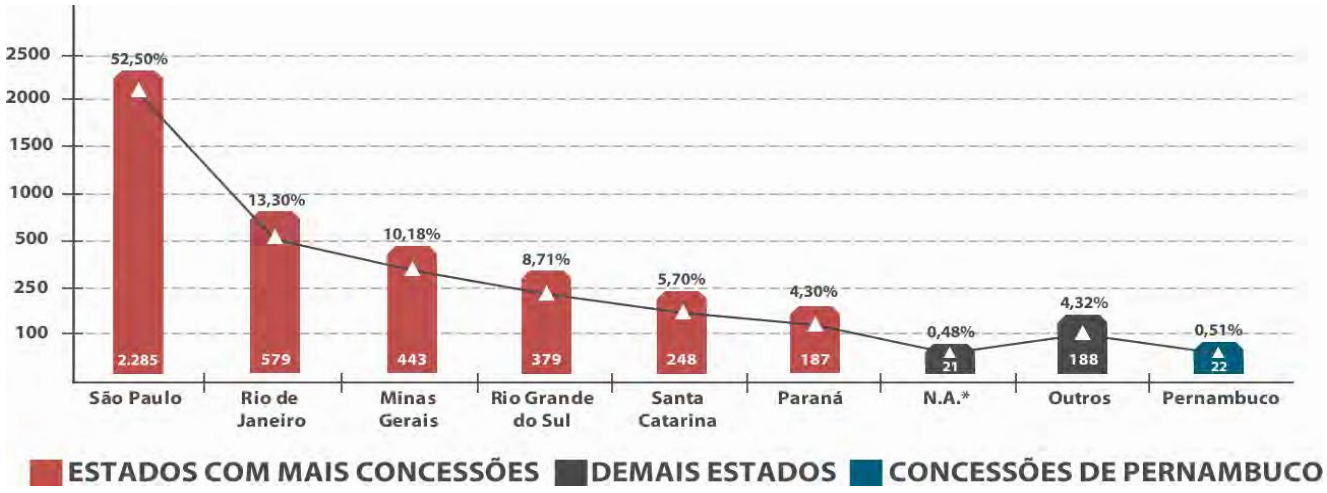


Figure 3 - Brazilian States with greater representativeness in the total number of patents granted for invention in a period between the years 2000 to 2012

Source: INPI Statistical Yearbook of Industrial Property, extracted in August 2020

It is possible to see that entrepreneurs in the State of Pernambuco need to understand better about Intellectual Property, given that the largest patent concessions are concentrated in the states of the South / Southeast of the country, representing almost 96%. The other states, like Pernambuco, add up to the rest. It is based on the assumption that the general objective of this article is to make an analysis of Intellectual Property assets in a rising Local Innovation System, in this case, Pernambuco. As is well known, IP assets can accelerate the maturation of the Local Innovation System in Pernambuco, making it more competitive and fierce in the global market.

With regard to the representativeness of Brazilian states in the granting of patents for invention between the years 2000 to 2012, there is strong evidence that the average granting of deposits by states is 7.84% while in the state where there is a Local System of Rising Innovation, the number is 3.25% approval, which

makes the state with very little expressiveness in comparison to the number of patents deposited, at the time, by the entrepreneurs / subjects, according to the figure below:

Figure 4 - Comparison of patent grant and deposit

Source: INPI Statistical Yearbook of Industrial Property, data extracted in August 2020**.**

With specific reference to the state of Pernambuco and its municipalities, the graph below depicts the progress of the granting of patents required in the years 2000 to 2012, according to the Statistical Yearbook on Industrial Property,

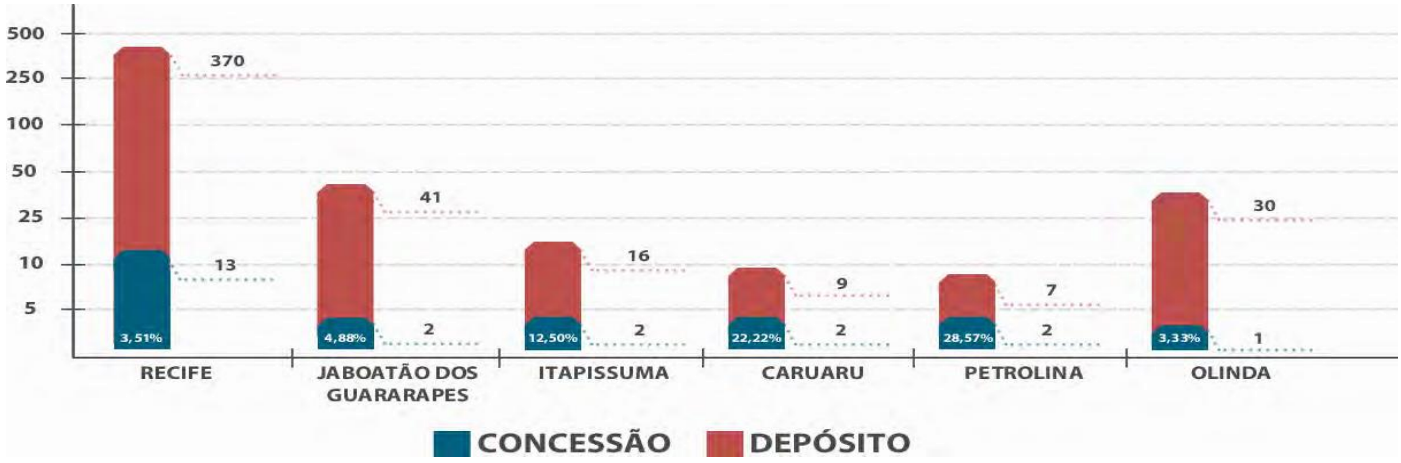


Figure 5 - Progress in the granting of patents required in the years 2000 to 2012.

Source: INPI's Statistical Yearbook of Industrial Property, extracted in August 2020.

It is noticeable that the deposit-concession ratio, which is too low, to be considered a good patent determination, taking into account that the Local Innovation System in Pernambuco was already considered to have one of the best developed Technology Parks - Porto Digital - according to FINEP, however without visibility of Intellectual Property.

With respect to the various R&D institutions, the figure below shows the number of depositors in the state of Pernambuco regarding the chronology between 2006 and 2014, according to the National Institute of Industrial Property.

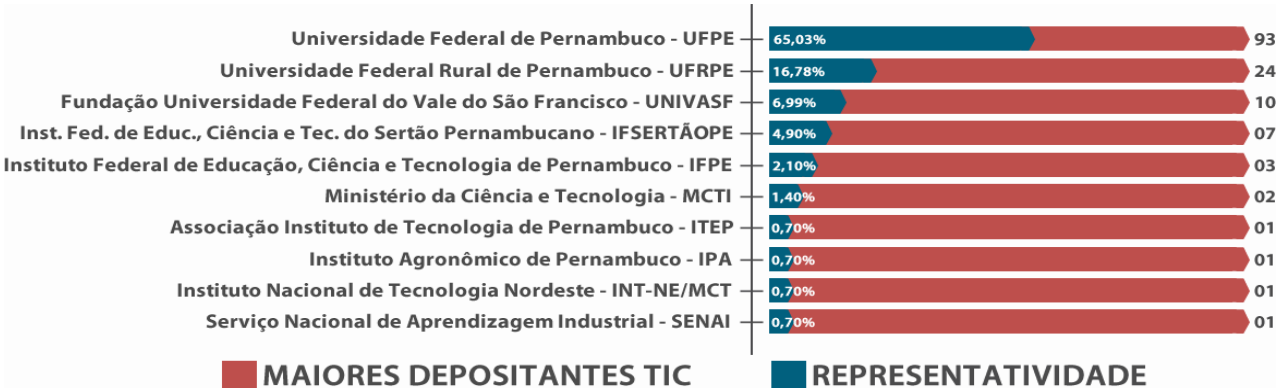


Figure 6 - Largest depositors by Education and Research institution in the State of Pernambuco for January 2006 to May 2015.

Source: (INPI / July 2015)

Source: (INPI / July 2015).

According to the graph above, Pernambuco's Higher Education Institutions account for 88.06% of deposit requests than other state education and research institutions. This data reminds us that many of the institutions do not have patent applications and / or do not know about Intellectual Property assets or do not yet have knowledge of the importance and promotion of IP assets.

Regarding the filing of patents from legal entities in the state of Pernambuco, considering that the percentage of patents from companies in the state is much lower to the detriment of the graph of depositors for Education and Research for the years 2006 to 2015, it is worth noting that there is a mismatch conceptual between higher education institutions and the business environment to which the state of Pernambuco is inserted. It is necessary to further study the knowledge about the State's Intellectual Property assets, capable of mapping the promotion and / or lack thereof regarding Public Policies aimed at corporate Intellectual Property and Startups, which are so important vectors for the solidification and maturation of its Ecosystem.

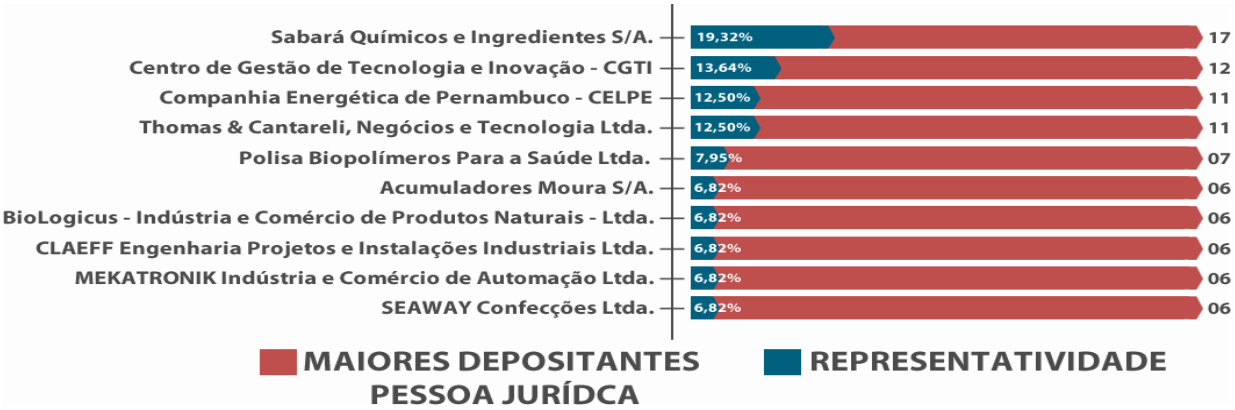


Figure 7 - Largest depositors per legal entity in the State of Pernambuco in the period from January 2006 to May 2015.

Source: (INPI / July 2015).

IV. Conclusion

According to all the understanding about this manuscript, the general objective was to demonstrate a chronological survey - 2000 to 2017 - on the Intellectual Property assets - PI and the relationship of fostering innovation and Intellectual Property, according to usability certain assets vis-à-vis the Local Innovation System in Pernambuco. Many works and / or documents were used as references, in order to mark this instrument that brought up important information about the understanding and promotion of public policy based on Intellectual Property in one of the best structured and recognized Local Innovation System in the Northeast. It is based on the assumption that there is still a lot to spread about the IP concept and assets so that SLI Pernambucano gains even more competitiveness compared to Intellectual Property assets. It was found that there are 190 technology-based companies and Startups in the state, where a technological harmony is understood throughout the Pernambuco territory, in addition to a structuring force in its SLI, such as a number of 25 Research Centers, 23 Junior companies, 11 coworkings and 7 business incubators, in addition to 3 accelerators, where the Local Innovation System is believed to be on the rise. In contrast to the SLI Pernambucano, its weakness with respect to IP assets vis-à-vis other states with the same level of maturity in their Local Systems, such as Minas Gerais, Rio Grande do Sul and Santa Catarina, was demonstrated, demonstrating the vulnerability in the regarding the concept and practice of Intellectual Property. Regarding the average number of patent deposit concessions in the main Brazilian states, the average is around 7.84%. In the state of Pernambuco, this index drops to 3.25%, which shows that there is a lack of significant density in comparison to the other states and their number of patents deposited. Regarding the progress of patent concessions required in the state, the city of Recife has the largest number of applications filed. It is believed that this phenomenon occurs because of the proximity to the various existing R&D institutions in the locality. However, the low relevance of the deposit-concession ratio for an ecosystem that is considered one of the most developed in the country and which has one of the largest and awarded Technology Parks in Brazil by FINEP is indisputable. With regard to higher education institutions, Federal Institutions account for more than 88% of requests, noting that there is a very large deficit vis-à-vis other Pernambuco research institutions. It starts from the premise that there is a lack of information and / or awareness on the part of R&D institutions, capable of taking the state to higher levels in relation to public policies on Intellectual Property and its assets.

Regarding the filing of patents by legal entities, there are a significant number of large Pernambucano companies as the largest depositors, however the percentage is much lower than the institutions that promote R&D, evidencing a mismatch between academia-company, capable of making the process time consuming in what it concerns the increase in knowledge of the Local Innovation System in Pernambuco in relation to IP assets. It is worth taking into account that the largest number of companies, holding patents, are only 4 (four), leading to the consideration that Intellectual Property assets linked to IP policies should be more widespread and developed throughout the state and, in particular, in companies called Startups, so evident in SLI Pernambucano.

In view of the development of this manuscript on updated figures on Intellectual Property assets for a rising Local Innovation System, it is clear that there is a disorder in the importance of IP for the leap of the state towards technological and innovative development, which should solidify once and for all the Local

Innovation System of Pernambuco, being able to project the SLI Pernambucano to levels never seen before. It is assumed that there is a gap in the item Intellectual Property assets, which is already considered a strong Ecosystem in Northeast Brazil. It is considered that, in seeking other methodological and matrix ways to boost knowledge about IP assets, the state should take a leap towards geographic innovation, starting from the knowledge and realization of intellectual assets properties, capable of taking the referred ecosystem to assertive levels and international dissemination.

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Sleep Quality and Metabolic Disturbance in Public School Teachers of a Brazilian Capital

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ABSTRACT

Introduction*: Due to high demand and different work schedules, teachers can develop metabolic and sleep disorders.* ***Objective****: The aim of this study, therefore, was to verify the quality of sleep and the metabolic changes of public school teachers during an academic semester.* ***Methodology****: Longitudinal study, data collection performed during an academic semester, in a public high school in a capital of northeastern Brazil (lifestyle and disease history, sleep quality - Pittsburgh Sleep Quality Index, blood pressure and anthropometric measurements). Blood samples were collected to determine serum glucose and the lipid profile. All variables were collected at the beginning (Step 1) and at the end (Step 2) of the academic semester with the same teachers. Data analysis was performed using SPSS software version 25.0.* ***Results****: The sample consisted of 27 teachers with an average age of 44,7 years. The concentration of fasting blood glucose (92,30 vs 108.85) and total cholesterol (161.00 vs 173.59), were significant (p<0.025 and p<0.001, respectively) when comparing the blood samples at the beginning and end of the school semester. The poor sleep quality and daytime dysfunction showed changes between the values found between the stages of the study, resulting in significant values (p<0.001). Sleep efficiency percentage showed an improvement in the second stage (p<0.004).* ***Conclusion****: Through an analysis of the results, it was found that the lipid profile, serum glucose and some sleep variables changed during the academic semester, thus showing the need for care with this category of workers.*

Keywords: Teachers. Sleep. Sleep quality. School Health Services. Health Promotion

INTRODUCTION

Teachers are among the professional categories most vulnerable to the occurrence of leave from work due to vocal problems and mental disorders. Musculoskeletal problems and morbidities in general are also prevalent in this group of workers, whose mission is essential for the formation of citizens, as they contribute to the stability of societies, in addition to playing a fundamental role in the development of future generations. [1]

The teaching profession is considered by the International Labor Organization to be one of the most stressful ones.[2] Educators suffer due to both personal and professional demands that challenge them to meet external demands such as preparation of classes, ability to interact with their students and their particularities; as well as the pressing need to update their knowledge. In addition to the nature of their profession, they have to deal with overcrowding in classrooms, long working hours, limited leisure time, social and financial devaluation and bureaucracy in their services. For these reasons, teachers are emotionally and physically exhausted. [3]

It is also known that professionals who maintain a continuous relationship with other people for an excessive period of time and short intervals for their restoration, as with police, firefighters, health professionals and teachers, are more inclined to prolonged exhaustion and reduction interest in their trades.[2]

It is also noteworthy that the production and transfer of knowledge is a constant challenge that can impact sleep quality through problems such as drowsiness and insomnia[4]. A study carried out in Bahia found that 22.6% of teachers complained of drowsiness and 14.1% of insomnia[5]. Another study, with teachers from public schools, from two inland cities in the state of São Paulo (São José do Rio Preto and Campinas), showed that they reported sleeping an average of 6.8 hours and 6 hours a day, respectively[6].

Sleep is governed by the biological clock, influenced by the genetics of each subject and regulated in a 24-hour cycle. This regulation occurs due to external factors such as light, noise, odors, lifestyle, environment and professional responsibilities, among others.[4] Poor sleep quality, including deprivation, interrupted or non-restorative sleep, is associated with several adverse consequences, such as health problems (eg impaired insulin sensitivity, increased levels of total cholesterol and low-density lipoprotein), reduced quality of life and economic costs[7]. According to Benvegnú et al (2016) sleep deprivation over time culminates in metabolic disorders and cardiovascular diseases[8].

In addition, evidence of significant changes was found in individuals exposed to ~~a~~ few hours of sleep per day. These include serum elevations of cortisol and ghrelin, which contribute to a considerable increase in appetite and, on the other hand, increase the risk of developing metabolic diseases, such as diabetes mellitus (DM), arterial hypertension (AH) or obesity[9]. With regard to cardiovascular diseases, workers who sleep less than 6 hours a day have a quadrupled risk of stroke. [10]

Despite the growing recognition of the consequences of sleep problems, particularly for professionals who maintain a continuous relationship with other people, research on the associations between psychosocial work stressors and sleep quality has been limited. Because of this, the importance of checking the sleep quality of high school teachers and possible metabolic changes that may occur during an academic semester was verified. Studying the possible causes and health problems during an academic semester is extremely important for the prevention of chronic non-communicable diseases and thus helping these professionals.

METHODS

Kind of study

It is a longitudinal study with data collections carried out at the beginning (Stage 1) and at the end (Stage 2) of the academic semester.

Study period and place

The research took place during 2018 at a state school in the city of São Luís, in the state of Maranhão, Brazil.

Sample / Sampling

The study population consisted of teachers from a public school. Teachers who signed the Informed Consent Form (ICF), of both genders, were included, regardless of age, ethnicity and socioeconomic level. Teachers needed to have an employment relationship with the school (attested by the unit's director) in the morning and afternoon shifts.

Teachers who worked in other school units, who worked the night shift, who had extra jobs and / or who self reported insomnia or difficulties sleeping were not included in this research. Teachers who did not participate in any data collection stage were excluded from the sample. The sample was non-probabilistic consisting of 30 teachers, after the inclusion and exclusion criteria, three participants were excluded from this sample (due to the non-participation of the second stage of the study - end of the academic semester), with a quantity of 27 participants remaining.

The data analyzed for each participant were: lifestyle and disease history, sleep quality - Pittsburgh Sleep Quality Index (PSQI), blood pressure, heart rate, body weight, height and body fat quantification - bioimpedance polar polarity Maltron brand, waist circumference, serum concentrations of glycemia and components of the lipid profile. All variables were collected at the beginning of the semester and at the end of the semester with the same professors and the same team of researchers (standardized processes to guarantee the quality of data collection and decrease of possible bias).

Statistical processing

For the data file and the statistical analysis, the SPSS software (Statistical Package for the Social Sciences, Inc., Chicago, IL, USA) version 25.0 was used. The data were treated using descriptive procedures (mean or median, standard deviation and percentage). The Kolmogorov-Smirnov test was used to verify the normality of the data. For comparisons between groups, Student's t test for independent samples was used. The Mann-Whitney U test for variables that do not have a normal data distribution. The results were considered statistically significant at $p < 0.05$.

Ethical aspects

Participants were included in this research after being informed in detail about the study, understanding the purpose of the study and signing the Informed Consent Form. The present study was conducted according to the National Health Council resolution - CNS no. 466/2012, with Opinion No. 2,673,791.

Results

The socio-demographic characteristics, health histories and life habits of the 27 teachers are shown in Table 01, where there was a prevalence of females with 70.4% (19/27) of participation. The age group of this population averaged 44.70 years (± 8.416). Regarding the presence of a partner, 77.8% (21/27)

reported having a partner living in the same residence. Regarding the self-declared skin color, 63.0% (17/27) were white. Table 1 also shows a higher prevalence - 66.7% (18/27) of teachers with a history of arterial hypertension and 63.0% (17/27) without a history of diabetes mellitus.

Most of the participants reported not smoking - 77.8% (21/27), not drinking alcoholic beverages - 51.09% (14/27) and not using medications that aid sleep - 96.3% (26/27). Regarding the practice of physical activities, it was observed that this sample is characterized by a higher prevalence of people who do not practice any type of physical activity, with 70.4% (19/27).

Table 01 - History of health and life habits of teachers, from high school, from a public school in São Luís/MA.

Variables	Average and percentage (%)
Genre	
Male	29,6% (08/27)
Female	70,4% (19/27)
Age*	44,70 (±8,416)
Skin color	
White	63,0% (17/27)
Not white	37,0% (10/27)
Unity	
With partner	77,8% (21/27)
Without partner	22,6% (06/27)
History of Hypertension	
Yes	66,7% (18/27)
No	33,3% (09/27)
History of Diabetes Mellitus	
Yes	37,0% (10/27)
Not	63,0% (17/27)
Physical activity	
Yes	29,6% (8/27)
Not	70,4% (19/27)
Smoking	
Yes	22,2% (6/27)
Not	77,8% (21/27)
Alcohol consumption	
Yes	48,1% (13/27)
Not	51,09% (14/27)
Sleeping medication	
Yes	3,7% (01/27)
Not	96,3% (26/27)

* Data represented as mean and standard deviation.

The appreciation of anthropometric data showed that teachers were classified as overweight in Steps 1 and 2 of this study, as well as an increase in waist circumference. When performing the analysis of these data referring to Steps 1 and 2, no statistically significant results were obtained (Table 02).

Table 02 - Comparison between Stage 1 and 2, of anthropometric data of teachers, from high school in a public school in São Luís / MA.

Variables	Stages	Mean and standard deviation	p-value
Weight*	Stage 1 Stage 2	71,68 ± 17,855 72,71 ± 17,514	< 0,900
BMI*	Stage 1 Stage 2	28,333 ± 4,671 29,037 ± 7,401	< 0,500
CC*	Stage 1 Stage 2	88,63 ± 11,981 90,83 ± 13,307	< 0,500
Body fat*	Stage 1 Stage 2	34,13 ± 8,199 33,19 ± 7,603	< 0,500

BMI - Body Mass Index; WC - Waist circumference. Data represented as mean and standard deviation. **Student t test*.

When considering serum concentrations for laboratory determinations, high fasting blood glucose values were observed in Step 2, exceeding the limits considered normal (108.85 ± 45.640). Regarding blood pressure, there was an increase in the mean systolic (132.04 ± 27.855) and diastolic pressure (80.78 ± 16.092).

When comparing these data in Steps 1 and 2, it was found that there was a significant difference in the blood concentration of fasting glucose and total cholesterol (p <0.025 and <0.001, respectively). However, the same was not observed for the serum determination of triglycerides, blood pressure and heart rate (Table 03).

Table 03 - Comparison between laboratory data, blood pressure and heart rate, in Stage 1 and Stage 2, of teachers, from high school in a public school in São Luís / MA.

Variables	Stage	Mean (standard deviation)	*p* value
Fasting blood glucose (mg/dL)*	Stage 1 Stage 2	92,30 ± 19,177 108,85 ± 45,640	<0,025
Total cholesterol (mg/dL)*	Stage 1 Stage 2	161,00 ± 32,821 173,59 ± 97,708	<0,001
Triglycerides (mg/dL)*	Stage 1 Stage 2	211,74 ± 101,956 194,56 ± 115,435	<0,604
PAS (mmHg)*	Stage 1 Stage 2	122,11 ± 18,713 132,04 ± 27,855	<0,291
PAD mmHg)*	Stage 1	73,96 ± 11,302	<0,500

	Stage 2	80,78 ± 16,092	
FC (bpm)*	Stage 1 Stage 2	74,00 ± 10,817 71,67 ± 8,481	<0,542

SBP: Systolic Blood Pressure; DBP: Diastolic Blood Pressure; HR: Heart rate. mmHg: millimeters of mercury; mg: milligrams per deciliter; bpm: beats per minute. Data represented as mean and standard deviation. **Student t test*.

Regarding the comparative analysis of Steps 1 and 2 on bedtime, there was no statistical difference (p <0.521). The variable good subjective quality of sleep, which deals with the perception of the individual's quality of sleep, showed that in the 1st stage with 63.0% (17/27) and in the 2nd stage with 66.7% (18/27) and showed no statistical difference (p <0.500). However, the poor quality of sleep proved to be relevant when it comes to the difference between Steps 1 and 2, as it increased from 66.7% to 81.5%, with a statistically significant value (p <0.001). In the daytime dysfunction there is also a statistical difference between one stage and another, with p value <0.001. Regarding sleep efficiency, there was an improvement in its percentage with values greater than 85% (p <0.004) (Table 04).

The variable that obtained the greatest difference between their percentages was the use of sleeping pills, in step 1 only 3.7% used sleeping pills while in step 2 85.2% started using them.

Table 04 - Comparative analysis, between Stage 1 and Stage 2, about hours in bed, subjective quality of sleep, quality of sleep, daytime dysfunction, sleep efficiency and use of medication by teachers, from a high school in a public school in São Luís/MA.

Variables	Stage	Mean (standard deviation)	*p*-value
Bed hours*	Stage 1 Stage 2	6,82 ± 1,245 6,52 ± 1,431	<0,521
Good subjective sleep quality	Stage 1 Stage 2	63,0% (17/27) 66,7% (18/27)	<0,500
Poor sleep quality	Stage 1 Stage 2	66,7% (18/27) 81,5% (22/27)	<0,001
Presence of daytime dysfunction	Stage 1 Stage 2	70,4% (19/27) 62,7% (18/27)	<0,001
Sleep efficiency*	Stage 1 Stage 2	88,85 ± 14,298 89,90 ± 11,456	<0,004
Use of sleeping medications	Stage 1 Stage 2	3,7% (01/27) 85,2% (23/27)	**<**0,472

**Teste t – student.*

DISCUSSION

Professional occupation has important psychosocial functions, which are commonly related to the biopsychosocial context. Employment facilitates social contacts and appreciation and is often an important part of an individual's identity. Despite this, the social characteristics of work can be an important source of health problems [11]. According to the American Academy of Sleep Medicine, normal sleep is essential for individuals to have a productive waking period and a feeling of permanent well-being. However, there is a difficulty in finding a definition for normal sleep since each person has their particularities, whether of biological or mental origin [12]. In this context, it is known that teaching is an activity that has numerous social relationships and, in general, it is highly stressful, with repercussions on physical and mental health which can affect sleep quality and professional performance, which justifies studies with this professional category [13].

This study showed a higher prevalence of females, being in collusion with other studies with teachers/professors, who report that the teaching staff has a higher percentage of women. A cross-sectional census epidemiological study carried out in the municipal education networks of Vitória da Conquista (Bahia/Brazil) in 2002, showed that of the 794 teachers, 747 (94%) were women.[14] This fact was also observed in a study published by UNESCO, [15] in which in a population of almost five thousand teachers, from different levels of education, 81.3% of these were female. It appears that in the capitalist patriarchal model the presence and, currently, predominance of women in the exercise of teaching has been guided by the sexual division of labor. Therefore, women would be taken to the teaching profession because of their "nature", prone to the maintenance of human relationships and care practices. [16]

In this study, there was a prevalence of overweight in the 1st and 2nd stages. However, data from a school in the Jequié (Bahia/Brazil), with 251 teachers, showed that the overall mean BMI was 24.93 kg/m^2. Perhaps this difference between the studies is due to the sample size, proportionality between the genders or cultural and food customs of each location, for, despite being cities in the northeast of Brazil, they have different eating habits. In turn, the high prevalence of overweight/obesity among teachers in the present study points to the need for preventive measures and control of this morbidity in order to avoid health problems resulting from overweight in the adult population [17].

In the analysis carried out on the percentage of body fat, there was a high prevalence of body fat at the beginning of the semester and in the second stage this high percentage remained, which shows the need for activities that can contribute to the teachers' energy expenditure, such as encouraging physical activity. In a study carried out with 760 teachers, from Basic Education (Elementary and High School) distributed in schools of the State Education Network in the urban area of Montes Claros (Minas Gerais/Brazil), there was also a high prevalence of excess body fat (57%). [18] A similar result was found in a survey carried out with individuals of both sexes from an Integrated Health Service of a Higher Education Institution located in the city of Teresina (Piauí/Brazil), with individuals aged 20 to 59 years, where it was observed that 74.68% of the population had a high percentage of fat, and 37.97% of the sample had a high risk for obesity [19].

In this context, it is known that obesity has reached epidemic proportions worldwide and, in parallel, there has been an increase in the prevalence of obesity-related comorbidities, such as insulin resistance (IR), type 2 diabetes mellitus (DM2) and metabolic syndrome (MS), collectively called cardiometabolic risk [20]. The underlying etiology of the increase in the frequency of these conditions is multifactorial, with well-recognized contributions from the diet (large portions, nutrient-rich foods and others) and physical inactivity; however, these factors alone do not explain the significant obesity epidemic, which is why there is a need to establish programs to encourage the practice of physical activities and healthy eating, aiming at reducing health problems.

The multiple work demands of teachers can constitute physical and mental health as risk factors for health[21]. In this study, a significant difference was observed in the poor quality of sleep between the two stages of the research, which corroborates the findings of the literature, such as, for example, data from a Swedish research where a positive association between high work demands, disturbed sleep and non-restorative sleep[22] was demonstrated. An analysis of sleep quality carried out with teachers from a private college in Valparaíso (Goiás/Brazil), resulted in 57.9% of poor sleep quality. The scientific literature has shown that among the various factors that impact the quality of sleep, the high workload and the need to work beyond business hours and outside institutional spaces, are directly associated with a teaching career [24, 25].

Among the data obtained, it was also observed that disorders related to sleep quality, daytime dysfunction, sleep efficiency and sleep quality obtained statistically significant values when compared between the different Steps (1 and 2), which corroborates with a survey carried out with 279 teachers from elementary school I, in the state network of a municipality in the state of São Paulo/Brazil. In this, among the participants 53.8% had poor sleep quality associated with the presence of physical and emotional symptoms, the need to perform multiple activities and the feeling of difficulty to complete all tasks.[16]

Another study involving 270 university professors identified excessive daytime sleepiness in 35.2% of them (using the Epworth sleepiness scale) .[26] It is known that impaired sleep, without favoring rest, causes consequences that are often imperceptible , but highly threatening to physical integrity (eg, muscle pain and gastrointestinal problems), emotional (eg, anxiety disorders and depression), relational (eg, irritability and high absenteeism) and productive (eg, lack of attention and lower productivity at work), becoming, in general, a public health problem that deserves further investigation [27]. It should be noted that teaching involves frequent interactions with students, colleagues, administrators and parents, which can result in emotional dissonance[28] and this is also relevant to the excessive wear of teachers and changes in their quality of life [29].

Regarding laboratory data, it was found that in the second stage there was a higher prevalence of increases in serum analyte concentrations. The analysis of the results of the exams for Stage 1 and 2 showed statistically significant results for fasting blood glucose and total cholesterol, thus showing that, during the academic semester, there were negative metabolic changes for the teachers' health. Metabolic changes that were possibly influenced by the context surrounding the school environment, work relationships and sleep disorders. Epidemiological evidence, although they cannot determine causality, attributes an important role for sleep in the modulation of metabolic homeostasis[30]. Thus, as sleep restriction (<7 hours/night) and potentially excessive duration (> 8 hours/night) seem to increase the risk of insulin resistance and type 2 diabetes mellitus, this relationship being modulated by age, race and ethnicity, although the degree to which these differences have underlying biological and non-socioeconomic bases remains uncertain [31].

Given the different evidences that show the association between insufficient or prolonged sleep duration and cardiovascular risk factors, it is not surprising that there is an effective association. Several large prospective cohort studies published in recent decades have indicated that insufficient and long sleep duration are associated with an increased risk of coronary heart disease and its predisposing risk factors[31]. The Whitehall II study (with 10,308 adult English men and women aged 35 to 55 years, with a follow-up for approximately 15 years) found that participants with short sleep duration (≤6 hours) and restless and disturbed sleep had the highest reason for chance (RR: 1.55, 95% CI) [32] for cardiovascular disease. Likewise, in the Cohort of Health Nurses (with 71,617 health professionals in the USA, aged between 45 and 65 years and with 10 years of follow-up), adjusted odds ratio (RR) values (95% CI) for disease cardiovascular for individuals who report 5 or less, 6, and 7 hours of sleep per night, on average, were 1.45 (1.10-1.92), 1.18 (0.98-1.42) and 1 , 09 (0.91-1.30), respectively[33]. Several other studies have found similar

results in a variety of different adult populations of varying ages and ethnic backgrounds: some found associations only between insufficient sleep (with or without poor sleep quality) and risk and / or mortality from coronary heart disease while others found associations in U-shape, with short sleep and excessive sleep associated with an increased risk of coronary heart disease[34].

In this context, the importance of this study is emphasized, which aimed to verify the quality of sleep and metabolic changes during the academic semester in high school teachers. With the results obtained, there is a need for attention about the health of teachers, who are essential to society and are exposed to a wide range of work stressors, which increase the likelihood of health risk and well-being.

The strengths of the study include the use of well-trained interviewers, the data set (sleep questionnaire, anthropometric data and laboratory tests) and longitudinal planning - two steps (beginning - post-vacation and end of the school semester), which makes it possible to understand changes in variables over time. And despite the short time (1 academic semester) of this research, it encourages future studies to verify causality. It is understood, however, that the limitations must also be considered in the interpretation of the results. First, the sample size that makes it impossible to infer results for the population of this occupational niche. According to the nature of self-report, because although self-report data are predominant in a study evaluating sleep quality, the integration of self-report and objective measures of sleep disorders would strengthen the design and the results obtained. Finally, here we used only one item to measure sleep quality that does not allow us to differentiate sleep characteristics in such a complex way and that previous studies have found to be related to sleep and metabolic changes and the teaching profession.

CONCLUSION

Through an analysis of the results, it was found that the lipid profile, serum glucose and some sleep variables changed during the academic semester, thus showing the need for care with this category of workers. Thus, we suggest further studies in this area, as informing teachers about their health status and changes in their sleep favors the early diagnosis of diseases and the development of health promotion and prevention policies.

ABBREVIATIONS

IR - insulin resistance
HA – Hypertension
DM - Diabetes Mellitus
MS - Metabolic Syndrome
CNS - National Health Council
UNESCO - The United Nations Educational, Scientific and Cultural Organization
SBP - Systolic Blood Pressure
DBP - Diastolic Blood Pressure
HR - Heart Rate
BMI - Body Mass Index
WC - Waist Circumference
GC - Body Fat
PSQI - Pittsburgh Sleep Quality Index
FICF - Informed Consent Form

ACKNOWLEDGMENT

To the participating school, through the direction that helped us with the activities carried out for this research. To the executing team and the team coordinator who are fully committed to seek the data efficiently and honestly. Special thanks to the teachers participating in this research, who collaborated with the data collection and encouraged us not to give up. To CAPES, that through the availability of a scholarship it was possible to carry out this research with dedication and efficiency.

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Delinquency as the Failure of Adults and the Village to Exercise Their Moral Strength

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Abstract

This paper examines multiple relationships among several concepts to determine common causes to delinquency and to suggest intelligence-based alternative to resolve this public health hazard. Juvenile crime has become a public health hazard because the regularity, brutality and impunity by which juveniles commit their crimes these days is indescribable and their state of mind is "unplaced". Delinquency may be defined as the behavior consequent to the failure of adults and the village to exercise their moral superiority and integrity to produce behavior that conforms to standards set as norms with some degree of consistency in a society to which legal sanctions are leveled (Obinyan, E. 2011). Adult's moral superiority may be defined as the ability to recognize the differences between acceptable and unacceptable behavior….Adult's moral integrity may be defined as the ability of individual adults to refrain from unacceptable behavior and to communicate to youths through example, conventional acceptable behavior (Obinyan, 2011).

Village moral superiority entails the ability of each group, community or the society at large to establish norms that are consistent with cultural values. Village moral integrity entails the ability of the village as a whole to uphold, reinforce, and consistently demonstrate and communicate the sanctity of these cultural norms. Moral strength, therefore is the combined effect of the village and adult's moral superiority and integrity (Obinyan). Children and youth social contexts are important contributors of problem behavior (Dishion, Forgatch, VanRyzin, & Winter, 2012; Dodge, 1983). In deviant peer groups, it is common for youth to engage in deviancy training wherein deviant behaviors are reinforced such that discussion of rule-breaking behavior is linked with a positive consequence (e.g., affirmation; Dishion, Spracklen, Andrews, & Patterson, 1996). Youth association with deviant peers is associated with many problematic outcomes (e.g., drug use, violence; Dishion, Eddy, Haas, Li, & Spracklen, 1997; Dision, Capaldi, Spracklen, & Li, 1995; Dishion & Patterson, 2006).

Delinquency results when there is a relative absence of adult and village action, such as lack of moral integrity and respect for societal norms, a breakdown of unofficial social control and adult and the village inability to agree on the definition of what behavior may be regarded as delinquent. This is why delinquency may be seen as a function of the type of relationships between adults and the village, and their perception of and attitude toward delinquency. For a particular person however, the definition of delinquency may depend greatly upon their cultural background and the inability of the adult and the village to properly use their moral superiority and integrity to impact on all members of their communities. In most cases, the relative weakness of adult and village moral strength should account for the delinquent behavior. When delinquent recidivism becomes a problem and a continuation of delinquent behavior is consistent and intensifies, we would expect that the steam or vitality of adult and village moral strength (moral superiority and integrity) has been let out.

Moral Supervision of Primary Groups and Moral Strength

Since the primary group is the first interaction for developing consistent conventional behavior, it is crucial for the primary group to exercise their moral strength over children within and outside their group. The child within the primary group may develop delinquent personal values in the absence of moral strength. Peers will not contaminate the child if the village is exerting its moral strength on all youths.

Establishing moral control is an important part of socialization within and outside of the primary group. The primary group must be able to survive when there are disruptions that may emerge due to economic or financial deprivation. Several factors can contribute to destabilize the effect of moral strength within a group. Economic deprivation for example, may dismantle the foundation laid by adults and the village's moral strength. This may be triggered by feelings of helplessness, instability, and dismay especially when the pattern of the quality of life as they know it is threatened.

The effectiveness of the moral strength, and the effect of it on members of the various groups, become weak and loses its grip on member's consciousness. Morality loses its control over members of the group, "since economic dependency appears to have marked disintegrative effects upon group unity and control and the child's acceptance of social control, adolescents from these family units could be expected to meet their needs more often through delinquent activity than members of families who are not similarly deprived" (Albert J. Reiss, Jr. 1996).

Norms and rules, although regarded as building blocks of personal control and as support for character development, may not be enough for maintenance of personal control within or between groups when threatened by a specific social problem. The importance of moral strength is that it fastens and cements norms and rules for personal control and character development. It must be the responsibility of adults and the village to emphasize "social bonding" to the youths in the community. This social bonding as explained by Travis Hirshi (1969) in his concept of social bond, may be the missing link in the development of various youth programs today. Hirshi suggested that youths with close bonds to social groups and institutions (e.g. family, school, and church) are less likely to have tolerance for delinquent behavior. The value of social bonds is that it help establish important and respectable relationships. The establishment of these relationships or bonds is accomplished through attachment (emotional),

commitment (investment), involvement (participation), and belief (acceptance of moral values, laws, norms and rules).

Hirshi's position is that youths who are attached, committed, involved, and believe in societal moral values (adults and the village moral superiority and integrity) and laws, norms, and rules are least likely to be delinquent. Unfavorable moral ideas are risks that may persist in certain communities. This morally risky environment in conjunction with other dysfunctions, are contributory negative sources for delinquency.

Communities with favorable moral strength will develop good character and personal control of its' members.

The Village and Institutional Checks and Balances and Moral Strength

Most people's primary source of socialization is the family unit. However, the fundamental source of individual control is derived from the community or village social control and institutional checks and balances. The village is the community. Institutional checks and balances manifest themselves in the methods by which the different social agencies behave. These agencies (e.g. churches, schools, families, media and law enforcement) must play their role as members of the village. The churches, the schools, the family and adults in the village, must stress the moral strength of the village. The different methods each social agency uses to accomplish the communication of the value of moral strength to their members must check and balance.

Some Social scientists have suggested that delinquent behavior will be more pronounced in certain areas of the village. These areas are characterized by factors known to be correlated with crime rates. It is our contention that moral strength can subdue neighborhood social risks (factors correlated with crime rates). Adults and the village who exercise their moral strength will have a profound impact on the character and personal control of individual members of their group. Such a community will actually have less delinquency. The consistency of moral strength over time will determine the overall behavior of youths in any community

SOCIAL CONTROL AND MORAL STRENGTH

The traditional social control methodology is not enough. It is argued here that delinquency can be controlled by moral strength. That moral strength must be exerted through all available social institutions including schools, churches, media, work, the streets, Internet, and law enforcement. Adults' moral superiority and integrity must be present at all times and the village at large must exercise its moral superiority and integrity to curtail youth misconduct and produce behavior that is in conformity with conventional norms.

Traps and Moral Strength

There are however several impediments or social ills that may thwart the strength of moral power within and outside the community or village. Let us look at these social problems carefully but briefly. These factors we believe are partly responsible for adults and the village inability to exercise their moral strength.

It seems clear to us that we have uprooted from the public schools for example probably the most powerful pacifying agent and replaced it with inadequate educational bureaucracy, guns, controlled substances, sex, violence, prisons, and greed. Religion and moral strength maybe more powerful than these social problems that are today rendering us powerless over them. There is evidence to this proposition.

A study is recommended of those people who has been saved from the grip of past mistakes or any of the social problems that is fast destroying the family units or the society at large today. One will not be surprised to find that a majority of the participants will affirm that they found religion as their saving grace. They will ascertain that they found something [moral strength, religion and GOD] more powerful than any disruptive agent on earth. It is a pity that our leaders are unable to see beyond their personal aggrandizement, greed and power. The truth is that because of the nature of the capitalist system of the society and the fact that the social problems are becoming a crucial part of our culture, it may be very difficult for moral strength to dominate. We live in an addicted society, a society that is addicted to dope, sex, guns, prisons, violence, and greed. Now let's look at these factors that are competing with moral strength in one piece. The truth as we know it is that "dope" for example is an economic giant, so are the guns, sex, prisons, and violence market. They all are contributors to social and political decay of morality in the society.

The disorganization and dysfunction of social institutions and the physical and moral pollution of our youths can be traced to these untreated societal ailments. When for example, we place hungry, angry, and abused children in public school classrooms without the most powerful pacifying agent, the consequences are immeasurable. The problem does not lie with the poisoned stock [our youth], but with those who by doing nothing or saying nothing contributes to the delinquency of juveniles. The policy makers who are unwilling to make necessary but drastic changes, the teachers who sell dope from their classrooms, and in fact adults and the village that are addicted, afraid to challenge the status quo, ignorant or naïve about these issues are equally responsible for the delinquency of our youths.

It seems that the adults and the village are so addicted and may have internalized the contemporary material circumstances of the present that they have lost completely sight of the most important acquisition of life, our children. We do not want to give up our "dope", sex, violence, gun, and prison industries for selfish reasons. They are economically profitable, recreational, and exciting. Guns for example are lucrative commodity and may aid the drug and violence market, and so is the sex industry. We must open more prisons to accommodate the spoils of these industries and also the juveniles we have been grooming in preparation for adult institutions. THE POLITICAL AND SOCIAL INSTITUTIONS DELIBERATELY PROPAGATED "TRAPS" IN THE VARIOUS COMMUNITIES IN ORDER TO ATTAIN THEIR ECONOMIC AND POLITICAL GOALS. Unfortunately all youths from all edges of society have become trapped in this funk. A juvenile who is stained or polluted by this criminal culture and therefore unable to be reached by moral strength may follow any of the following routes or a combination of them to self-destruction. Those who are bio-chemically or neurologically afflicted may make a different journey.

A. Sex ⇒ birth of child ⇒ child support ⇒ inadequate job ⇒ selling drugs ⇒ prison or death.
B. Drugs ⇒ drug use ⇒ lose yourself ⇒ violence ⇒ crime ⇒ prison/death ⇒ family dysfunction.
C. Violence ⇒ prison ⇒ child abuse ⇒ spousal abuse ⇒ death.

D. Prison ⇒ mentally abusive environment ⇒ becomes a hardened criminal ⇒ loses family ⇒ violence ⇒ death.
E. Guns ⇒ violence ⇒ prisons.
F. Greed ⇒ white collar crime ⇒ robbery (street crime) ⇒ drugs ⇒ guns ⇒ violence ⇒ prison ⇒ death.

However, a 15yr old boy for example who follows the "A" route may be seduced by the sex industry and impregnate another 15yr old girl who decides to go through with the pregnancy and keep the baby. For some reason the two kids cannot get along and the young lady decides to pursue child support through the courts. Because of inadequate job and the pressure to pay child support the young man becomes restless, agitated, resentful, aggressive, and miserable. He drops out of school and "hangs out" among similarly afflicted crowd. A drug trafficker approaches and sells him the idea of making five times as much compare to the minimum wage at the local fast food restaurant. The young mind accepts the offer and begins his life of crime. What follows is either imprisonment or death on the streets and the impact on both of their families cannot be measured by any statistical computation.

Generally, we are in a state of moral funk, chaos and decline. Western civilization and morality is continuing to drown far deeper than one can imagine, so more resources, especially money must be spent on behavior control to at the least reasonably police those who usually are able to police themselves. In an effort to curtail on a sustainable basis, it is therefore necessary and pertinent to encourage the use of moral strength. In response to questions about TV, violence and popular culture, Lajos Csaszi [1999], quoted Elias constructively. "According to Elias, society's control and repression of violence for example, what is more its feeling of distaste and revulsion toward the phenomenon, can be regarded as one of the most important results of the civilizing process. --- far more violence was permitted in wrestling and boxing; for instance, the breaking of bones and strangling in classical antiquity than would be imaginable in sports today" However, different societies at different developmental stages have resisted violence in sports with norms to protect society.

The problem today is that violence in sports is glorified and valorous. Furthermore, the youths of our society are heavily exposed to violence through several medium. The effect on our youths is devastating. We cannot afford to continue to breed a generation of violent people. In a similar response to a familiar problem, Ericsson [1991], argued that " the maintenance of moral sensitivity and loyalty toward public values fulfills an integrative function in modern societies and this includes the nourishment of collective emotions as well as the satisfaction of a desire for the sight of vengeance." The adults and the village are accountable to the success of moral strength in the fight against delinquency.

The value of a cultural phase may change, but most remains relatively stable during any one person's lifetime. So socially shared and intensely felt values are a fundamental part of our lives in the United States. In an annual survey of first year college students attitudes, a commonly used criteria of the values of the united states focusing on a plethora of issues, beliefs, and life goals; for example, respondents are asked if various values were important to them [i.e. being well-off, promoting racial understanding, controlling delinquency, etc.] Austin et al., [1997] reported that "over the past 30yrs, entering first year college students in the united states have become concerned with becoming well-off financially and less concerned with

developing " a meaningful philosophy of life". In other words there has been significant movement in attitude away from those issues that promotes moral values and moral strength.

The moral foundation laid down by our forefathers should serve as a potent lesson. In Ayn Rand Institute[1999], men learn from each other, they build on the work of their predecessors, they achieve by cooperation feats that would be impossible on a desert island. But all such social relationships require the exercise of the human faculty of cognition; they depend on the solitary individual, solitary in the primary, inner sense of the term, the sense of a man facing reality firsthand, seeking not to crucify himself on the cross off others or to accept their word as an act of faith, but to understand, to connect, to know. In his essay, John A Calhoun [2000], tells us that "entire neighborhoods and entire cities and counties have now subscribed to the belief that crime or juvenile delinquency is a community wide problem whose solution rests with the community.

Prevention and control have to include the involvement of all social agencies. Sanctions alone cannot quell over the onslaught of social problems. Public policies does not necessarily get us up any time of the day, our core beliefs do. It is important to uplift our personal commitment by rekindling it and embracing it based on our deepest principles. We must speak the truth about social problems with clear and unambiguous terminologies. Use words that quicken and move human spirit to do well, and act with moral strength without fear or favor. Jesus began his journey with moral strength and king jr. began with passionate moral commitment not with policy. Crime control policies are needed as much as moral strength is vitally important.

SOCIETY'S ADDICTION AND MORAL STRENGTH

The society at large is addicted. This addiction is grounded in the material circumstances of the present and our cultural values. Culture is defined by Shaeffer and Lamm [1998], as the totality of learned, socially transmitted behavior. It includes the ideas, values, customs, artifacts[as well as sailboats, comic books ,TV, birth control devices, etc] of groups of people. Therefore patriotic attachment to the flag is an aspect of the culture, so is our attachment to sex, dope, guns, prisons, violence, and greed; the factors that competes with moral strength. There is no doubt that for moral strength to be more effective for personal control, the family institutions must again lead the way. Karol L. Kumpfer [1999] in the examination of the institution of the family stated that "family is the basic institutional unit of society primarily responsible for child rearing functions. Families are responsible for providing physical necessities, emotional support, learning opportunities, moral guidance, and building self-esteem and resilience". This should not be a difficult process. The human being is a moral agent who possesses both physical and mental or spiritual attributes.

We must take a page from Michael Braswell's "The lost art of relationships", It is his position that we cannot give to others attitudes and values we do not have. Furthermore adults and the village who have reached a place of discipline in their own life and with a sense of discipline involves one who has internalized his or her personal and professional values. These values Braswell tells us are forged and tested through a lifetime of experiences, come from a wellspring deep within the core of the person's being. So we just cannot give to our youths the values or morality that we cannot afford. We must first heal, cleanse

ourselves and morally modify our personal values so we may have the moral strength to transmit and spread to our children.

In conclusion, this paper has examined multiple relationships among several concept to determine common causes of delinquency and have tried to suggest intelligence-based alternatives to resolve this public health hazard. In attempting to define juvenile crime which we believe has become too regular and brutal, we state that its occurrence may be attributable t the failure of adults and the village to exercise their moral superiority and integrity to produce behavior that conforms to the standards set as norms with some degree of consistency in a society to which legal sanctions are leveled. We have discussed the moral superiority which entails the ability of each group or community or a society to establish norms that are consistent with cultural values. We argue that the failure of the village to hold and maintain its moral integrity, like the ability to uphold, reinforce and consistently demonstrate and communicate the sanctity of these cultural norms is what leads to and results in behavior breakdowns. Delinquency, we argue so results when there is a relative absence of adults and village action such as lack of moral integrity and respect for societal norms.

So, based on a general knowledge of human nature or probability, man must have moral support, the adults and the village must therefore appeal to the character of our youths by rejecting physical force and exerting moral strength that do not cost a dime. All the communities' s social institutions must emphasize moral strength, proper behavior, the difference between good and bad disposition, the principles of right and wrong, stress the sense of duty and right conduct, and the idea that we all are morally obligated to the society at large.

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Stop-Dengue: Game for Children and Adolescents with Down Syndrome

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Abstract

This work aims at presenting an educational game for people with down syndrome with a focus on learning how to prevent and diagnose, viral Dengue disease. STOP-Dengue game was developed considering bibliographic research, a search for apps classified as games on the Google Play platform for smartphones, and a survey applied to a group of parents and caregivers to identify the best kind of educational stimuli for children and adolescents with down syndrome. The game presents details about Dengue viral disease, encouraging the active participation of children in the learning of this subject. A group of students with down syndrome participated in the evaluation of STOP-Dengue. The results showed that participants learned the concepts about Dengue, and the majority were satisfied with the game.

Keywords: Learning, Games, Down Syndrome, Aedes Aegypti, Dengue.

1. Introduction

Dengue is one of the biggest public health problems in Brazil. Although several studies have shown significant results in reducing the spread of the Aedes Aegypti mosquito, the institutions responsible for controlling health policies are not able to implement them in different regions of the country simultaneously (Araujo, 2015; Maciel-de-Freitas, 2014; Carvalho, 2015).

Early identification of Dengue focus is important for decision-making and implementation of sanitary and public health measures (Brasil, 2016). Government campaigns included home visits to prevent mosquito

breeding sites for decades. They also count on the active participation of the population to detect and eliminate larvae that develop in aquatic habitats found in homes and neighborhoods.

According to Freitas et al. (2019), children are disseminators of information in their family and, through education, the community can know, learn, and participate directly in effective actions to combat Dengue. Thus, they can assume the role of transformation agent, spreading information and supporting behavioral changes in community groups (Alok, 2020).

However, in general, children with different intellectual disabilities do not receive information that is accessible to their level of understanding of this problem (Mastebroek, 2016). Therefore, it is essential to offer learning possibilities on this topic for children with different levels of cognitive impairment. Despite the prognosis, these children can learn from motivational stimuli.

According to Conners et al. (2008) children with Down syndrome have problems with short-term memory that prevents the proper behave of cognitive functions. Recent results pointed out that playful activities stimulate the memory of these children, especially when they use computer games (Cruz Netto, 2020). Shalash et al. (2018) stress that several studies have shown positive effects of games in stimulating perceptual skills, visual and spatial abilities, short-term memory, attention, and reaction time in children with Down syndrome.

In this context, this paper´s main objective is to present the educational game named STOP-Dengue to educate children with Down syndrome about preventive care, and diagnosis of the Dengue viral disease, transmitted by the Aedes Aegypti mosquito.

Game's development has followed the steps proposed by Teixeira, Cruz, and Gonçalves (2017): storyboarding, organizing the development process, and mapping the game's criteria. In the validation phase, a case study (testing) has been carried out with a group of students in the countryside of Minas Gerais, Brazil. This research was approved by the State University of Rio de Janeiro Research Ethical Committee with number 13149219.7.00005282.

This paper is organized in five sections, this introduction, followed by section 2, which presents the methodology of this research. Section 3 describes the STOP-Dengue game. Section 4 details the use of the STOP-Dengue by children with Down syndrome in a Public School. Section 5 presents the conclusion of the work and future works.

2. Methodology

This work was developed supported by the process described in Figure 1. The research has a quantitative and qualitative nature, addressing both methods at different moments. Firstly, a literature review concerning this theme has been searched in Scholar Google, Pubmed, and Medline's libraries. The applications classified as games in the Google Play platform for devices with the Android operational system was also searched. This platform is the most popular for smartphones in Brazil.

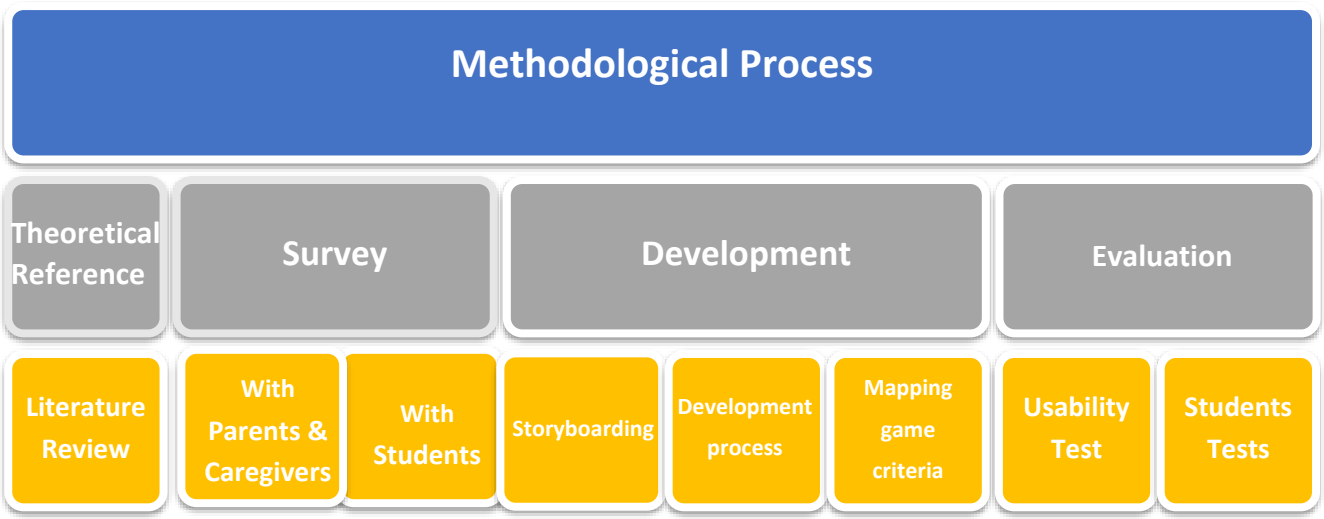

Figure 1: Research methodological process

In the literature review, terms in Portuguese and English have been defined, besides the inclusion and exclusion criteria of papers. At first, we identified 548 papers, and after four steps (title and abstract reading, removal of double works, introduction and conclusion reading, entire work reading), 19 relevant papers have been identified.

Among the papers, a systematic review has been identified with articles between 2001 and 2012 (Araújo, 2013), concluding that technological resources can and should be present in classrooms, especially with inclusive education. Several papers (Pereira, 2013; Brandão, 2015; Domingues, 2017; Farias., 2013; Diatel, 2016; Lima,2011; Menezes, 2016; Oliveira, , 2017; Pinto, 2013; Rodrigues, 2014; Santos, 2012; Serra, 2017) have used and analyzed games and game therapy aspects as an educational resource for people with Down syndrome.

In the Google Play search, the terms used were: Down syndrome, and Dengue. Concerning the games search about Down syndrome, four games have been found: Jade Autism, Downex, Ludkids Games, and Special Words. All these games have activities that aim at skill ability development, especially skills linked to alphabetization or prerequisites for it.

In the Dengue games´ search, ten games were found; eight of them are in the education or teaching categories, one classified as an adventure (Aedes Aegypti – The Epidemic), and another as action (Zika Smash). All games have activities that demand motor skills. Some games (Out Zika RP against dengue and XDengue) have a quiz that reinforces learning about the subject. In some games (Against dengue the game, Out Zika RP against dengue, Zika Smash, and Den game), orientations and tips related to prevention were presented. All games had as unanimous goal to pulverize (or exterminate) mosquitoes and collect all the mosquito focuses. The use of augmented reality was present in several games as well, such as Brinquelonas Super Agent and AEDES in focus – The Game.

After selecting and analyzing the papers and games, we applied a questionnaire to parents and caregivers of children with Down syndrome to know the profile, wishes, and perceptions of these children to define the graphical and activities elements that should be present in the game. A group of 77 participants answered the questions. The Syndrome Down individuals had ages varying between 1 and 41 years old.

The average age was 8.4 years, with a standard deviation of about 7.4 years that stress high heterogeneity in the age range. Age, although relevant, in this case, cannot be considered in a restricted way, as it does not match habitual intellectual development (Hodapp, 2003). People with Down syndrome, even at a high age, can be represented here.

Based on the results of literature research and survey we observed that children with Down Syndrome prefer games with challenges, simulation, and awards. The games should be a playful, simplified with a clear and objective layout, presence of vibrant colors and ludic images; activities and environments elements close to everyday life; capital letters; error indications; tasks of association, memory and motor skills to exterminate dengue mosquitoes and sources of contamination; in addition to presenting tips on prevention and care against dengue. They should have a logical explanation for each action and awards.

Objectivity is the main factor and the preference for games that involve challenges and associated decisions. The results of the bibliographic research and the responses of the families pointed out that people with Down syndrome have low ability to concentrate for long periods.

3. Game Development

STOP-Dengue goal is to teach children with Down Syndrome essential information about Dengue and ways to prevent this disease. The game encourages participation in the learning process through a narrative that induces empathy with some characters. Ana, the best friend of the main character (player), has been sick with Dengue. Initially, the player must understand the situation and from this fact, the journey of knowledge begins. He must fight the mosquito that transmits the disease. During this battle, he knows the symptoms of Dengue, Aedes Aegypti mosquito characteristics, locations of the main foci of insects, and the safe use of repellents and insecticides. The game supports learning by immersion in the content exploring funny images. It includes two mini-levels tests, to stimulate the short-term memory by memory and reasoning tasks.

Considering that people with Down syndrome learn from visual information and 50% of them have difficulty in seeing, Stop-Dengue game adopted bold colors on the buttons, and large images, and letters. (Movimento Down, 2013).

An additional feature of the game is the possibility of identification with the characters and situations. The player can see himself within the narrative, experience new physical appearances, being able to choose different avatars. All characters have physical characteristics of people with Down syndrome and can be chosen to represent the players.

The game implementation used the Godot tool (Godot, 2019), an engine for game development compatible with platforms 2D and 3D.

To play, players must click on a button (Figure 2a). Then they must choose a character (avatar) from the available options (Figure 2b) and give him/her a name.

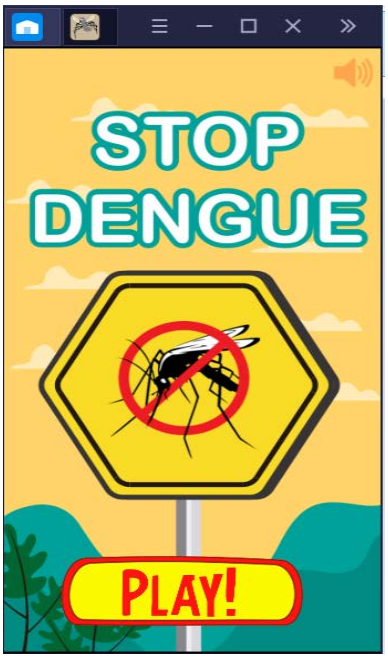

Figure 2a: STOP-Dengue home screen

Figure 2b: Avatar choice screen

The first scenario is the school (Figure 3a). There, the first situation is presented: the player notices that his/her friend Ana did not come to school. Then, the child's character is sent to Ana's house to investigate what happened to her. The character interacts with Ana and her mother. In the next step (Figure 3b), the player can know some Dengue symptoms by clicking on the yellow spots over Ana's body.

In the second level, the player knows a new character (the Biologist), who introduces herself (Figure 4a), and presents some characteristics of the dengue-transmitting mosquito (Figure 4b). The Aedes Aegypti mosquito can be viewed through a magnifying glass, and the game presents additional information about the mosquito by clicking on the "¡" icon.

Figure 3a: STOP-Dengue level 1

Figure 3b: STOP-Dengue level 1

Figure 4a: level 2 - conversation with the biologist

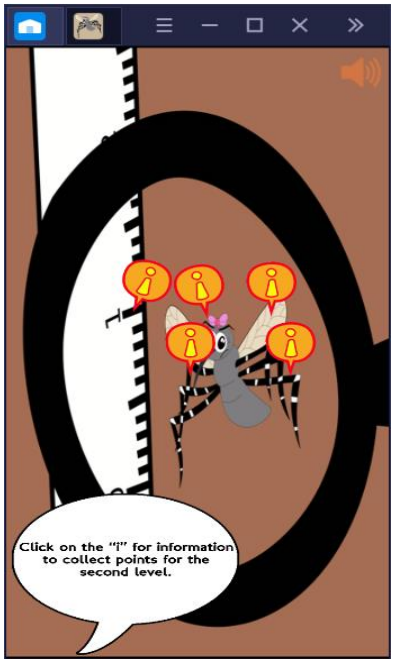

Figure 4b: level 2 - information about the mosquito

The goal of the 3rd phase is to present fundamental sources of mosquito proliferation, illustrating places where the mosquito can lay its eggs. Following several screens, players can visit different environments where they can know breeding focuses (Figure 5a).

The game has two mini tests that players must answer questions related to the theme. In the activity, named smart battle (Figure 5b), the player "fights" the Aedes Aegypti mosquito, using the insecticide or repellent for this. The biologist character provides instructions on how to carry it. At the end of the game, the player avatar and Ana appear in the room healthy and ready to play in the yard (mosquito-free). The player points obtained during the adventure game levels are displayed in the screen top with the bottom option to restart and play again.

Figure 5a: level 3-mosquito proliferation focuses

Figure 5b: level 4 - Smart battle

4. Results from a Pilot Study

To observe how players, perform and the educational value of this game, a pilot study was developed with eight students with Down syndrome from a fundamental level school in the countryside of Minas Gerais, Brazil. Participants were identified by the following nomenclature P1, P2, P3, P4, P5, P6, P7, and P8. The students participated in the experiment as an extra curriculum activity.

In general, we observed complete adherence from the participants, without negatives or hesitation in any phases.

Only one student (P7) was not literate, and the monitor helped to play the game. The other students can read and write. Among the eight students, only two are women. The participants have familiarity with the handling of technological devices, especially smartphones. A question about the use of virtual games confirms that they usually play.

P8 had an interest in participating in using his smartphone. However, he received instructions to use the device that contained the pre-test, the post-test, and the game evaluation questionnaire. The first activity consisted of the application of an online pre-test that the students answered with the help of the monitors, the second one a characterization questionnaire. Regarding age, the majority is in the age group of 18 to 25 (five students representing 62.5%).

Four students (50%) have a school level of education. Three have an elementary school level, and only one has a primary level. Summarizing, most of them have at least concluded elementary school, which makes them competent not only to play the game but to understand the knowledge passed through this educational resource.

However, when faced with answers about writing competence, 25% know how to write but need help from a monitor, 10%, which means one student, cannot write, and 65% masters this skill. Furthermore, knowledge of the world is required to answer the questions presented before the game is applied. Therefore, only two students pointed out that they do not know the Aedes Aegypti mosquito, but one of these students knew sicknesses that the mosquito could cause.

The students were asked if they knew the symptoms of Dengue before and after the game. Their answers are in Figure 6. Then, a list of seven Dengue symptoms were presented for students to indicate which were Dengue symptoms. Two groups of 4 students were created, considering the students' perception of the disease. All students who considered knowing the symptoms of Dengue hit, on average, four symptoms of dengue. A student who believed he did not know the Dengue symptoms marked all correctly answers.

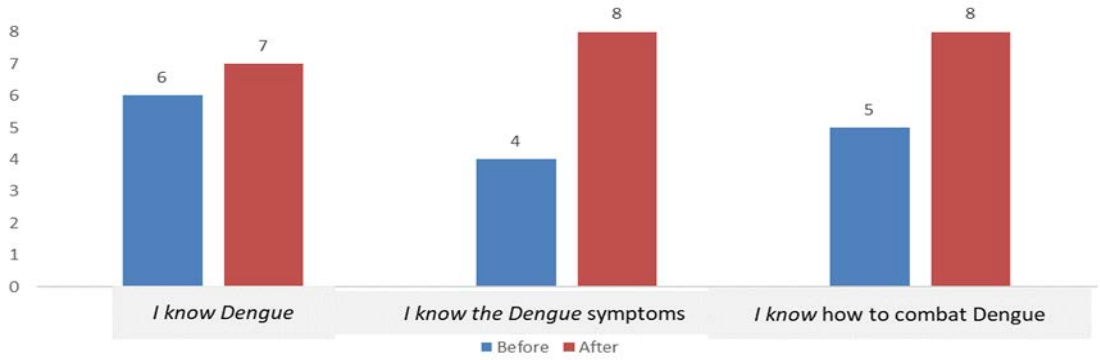

Figure 6: Students' Perception Knowledge Before and After using STOP DENGUE

After using the game, all students claimed to know the symptoms of Dengue (Figure 6). The Dengue symptom that became known to everyone was “Pain behind the eyes”, which was the least known before the game. "Headache" also had its recognition increased, and no student returned to mark "Blue spots on the body" as a Dengue symptom.

In a comparative analysis between the perception questionnaires applied BEFORE and AFTER the game (Figure 6), it was observed that all students learned about the symptoms and prevention after the game, once more showing its success rate.

A great acceptance of STOP-Dengue was observed after playing the game. After the game’s explanation about Dengue, its symptoms, and how to combat it, there was only one negative answer from a student (P2) concerning this information, according to Figure 7. However, this is questionable, since the student answered he does not know about Dengue, but answered he had learned about it, knows its symptoms and how to combat it. Thus, this is considered an inconsistent answer without great negative weight for general analysis. Meanwhile, all the other students informed they know and learned more about Dengue, representing a positive point for the game’s objective of teaching about Dengue.

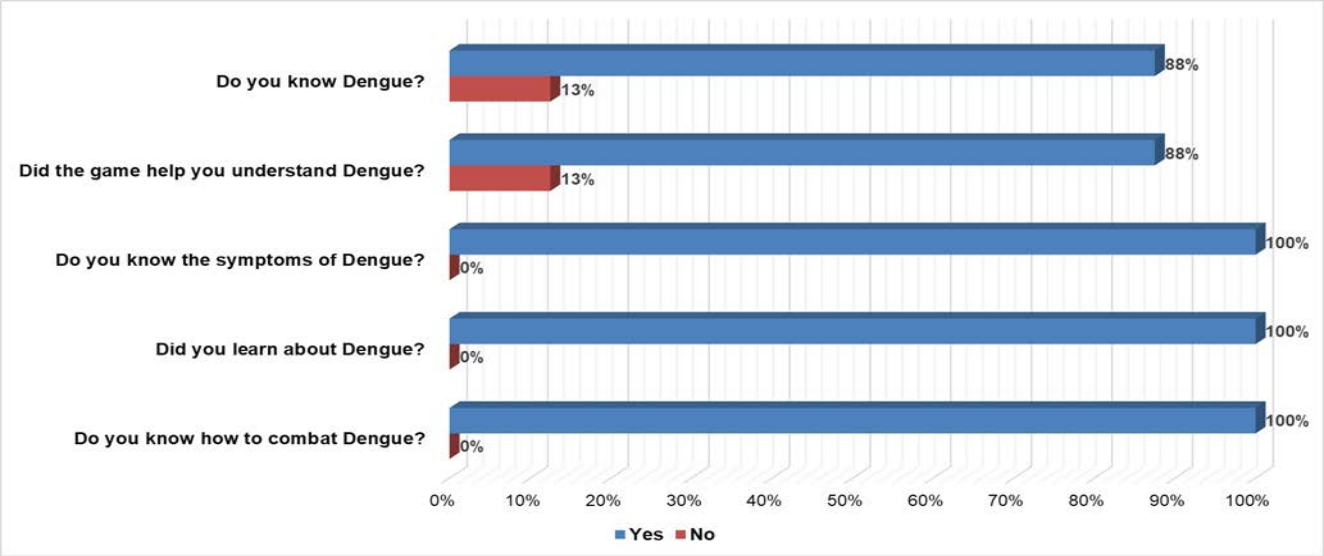

Figure 7: Students´ answers after using S TOP-Dengue game

All students liked the game and its characters. They also considered that language and instructions presented during the game were clear, and the final score encouraged them to play. The images and colors were interesting and attractive. Only one student said he did not like the songs very much; the others said they appreciate them. Figure 8 summarizes these answers.

Only one student considered that the game is not easy to play (Figure 8) and did not think that the plot helped to understand the necessary care with the mosquito. Two students considered the game to be too fast, while for others, the time was adequate.

All students stated they would recommend the game to a friend to broaden knowledge about fighting dengue.

Student P5 has had negative feelings towards the game and did not want to continue to play. Nevertheless, P5 would recommend the game to a friend. The same happened with student P2 that would recommend the game to a friend but did not want to continue to play.

After playing the game, the students reported that they felt happy for having learned and motivated about contributing to disease prevention.

Three teachers and monitors also answered some informal questions after supporting students to navigate the game. Their responses were positive, indicating the approval by these professionals, who expect the game to be a facilitating tool in the learning process of students with Down Syndrome on topics related to Dengue. Two of them made suggestions to improve accessibility: audio for illiterate students and larger font size.

The alert state observed during the experiment can be understood as a state of extreme attention towards the new educational approach. In general, the person with Down syndrome is very dedicated to tasks. Thus, he is not comfortable with the error. The excessive attention can be interpreted as a state of alertness, that generates some level of stress.

During the phase of playing the game, the students had some specific reactions, the participants appeared to be calm and with quick and firm answers without much hesitation or dispersion and with spontaneous answers.

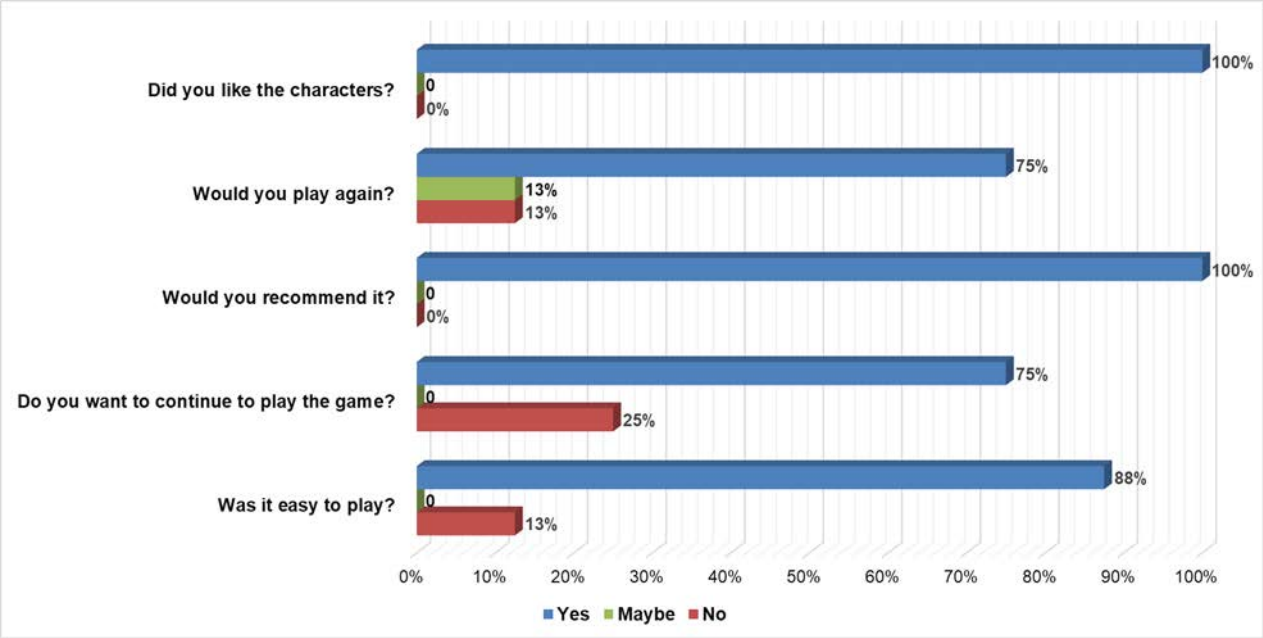

Figure 8: Students' Opinion About the STOP-Dengue Game

Another observation concerned facial expressions and some commentaries: P1 – "it was nice you asked this"; P5 – "…I know this"; P3 – "…I know… I know…".

During the experiment, students were concerned about the difficulties of other participants. Phrases like "Got it?", "I'll help you", "Is it over?" were heard at different times. The interaction favored the discovery of the level of knowledge of the participants in relation to the subject "Dengue", revealing that it is considered good as a basis for other approaches.

Concerning satisfaction, the most recurrent affirmations were about asking for installment in their own smartphones or obtaining the game: P8 – "I want this game, can I?"; P1 – "this is nice, I want to download it!"; P4 – "can I play again?".

5. Conclusion

The objective of this work was to present the development process of a game focusing on the viral Dengue disease transmitted by the Aedes Aegypti mosquito for people with Down syndrome. STOP-Dengue aims at offering essential information about Dengue and ways to prevent this disease in a ludic way.

For the game development, we considered the results of a bibliographic survey and an opinion survey carried out with family members and caregivers of people with Down syndrome.

Dengue is a serious disease and the educational material available does not have language or images accessible to people with Down syndrome. STOP-Dengue uses characters with physical characteristics of Down syndrome, to create a closer relationship with its users.

A two-step evaluation model was proposed for having performance results from end-users. The first considered a pre-test to verify what the players had as prior knowledge and a post-test, after using the environment, to verify the player learning. The second one aimed to identify satisfaction with the interface. The results showed that participants learned the concepts about Dengue, and the majority were satisfied with the game.

Educational games can support teachers and monitors as an educational resource adding to the unprepared environment found in schools in Brazil for teaching Down Syndrome students (Alencar, 2019). STOP-Dengue can be used by students with and without this syndrome and can be a tool for students with Down syndrome inclusion.

Finally, this game can be relevant for children and adolescent with Down Syndrome who need to learn about dengue, enabling them to have a funny experience. They can work their emotional and visual arousing, their interest in interacting with the content and consequently learn from that experience.

Some suggestions based on observation from teachers and monitors are: (i) Increase the font size; (ii) Including more sound guidance features; (iii) More praise and greetings, in order to reduce the state of arousal; (iv) Audiovisual resources for illiterate users; and (v) Overall improvement in accessibility.

The students did not make any critiques, but they were seen putting their faces close to the screen, which confirms the suggestion to increase the font size.

As threats to the validity of the research, we can consider that the number of participants was small. However, if we consider the profile of the sample, we consider that it was a reasonable number given the difficulty of obtaining access to people with Down syndrome. Access depends on approval by the Research Ethics Committee, contacts at schools and authorization from parents or caregivers.

As future work, after making the recommended changes, we hope to develop other experiments with more class days and more students.

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A healthy, innovative, sustainable, transparent, and competitive methodology to identify twenty benchmark countries that saved people lives against Covid-19 during 180 days

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Abstract

Since the "last day" of 2019, a new virus emerged in Asia, which in Feb./2020 was called by the World Health Organization (WHO, 2020) as Coronavirus disease (Covid-19). Due to its fast transmission, after eight months since the first global official case, at 23:59 (GMT) on August 31, 2020, the world has accounted for about 25,620,737 new confirmed cases with 854,222 deaths and 17,921,063 recovered cases (WORLDOMETERS, 2020). The pandemic is the newest challenge for all nations, most of them eager to learn from countries that are successful against the virus. However, until now, no methodology was developed to identify them by taking into account a holistic approach with international rankings concerned to health, innovation, sustainability, image, and competitiveness, as well as the estimated real number of fatal cases by one million population during the first 180 days of facing the pandemic. Thus, the main objective is to develop a holistic methodology to identify twenty benchmark countries that are saving people's lives against Covid-19. The research is applied, as its results and recommendations are useful for academy, government policymakers and authorities. It is descriptive, with a qualitative and quantitative approach, based on bibliographic and documentary research, involving the study of official sites, articles, reports, manuals, and other technical documents related to 13 international rankings. As a result, the fifteen phases of the methodology, far from perfect, shows that among 108 well-evaluated countries, the top six benchmark countries are from Asia (1) Vietnam; 2)
Taiwan; 3) Thailand; 4) China; 5) Malaysia; 6) Singapore), which suffered from fatal cases from first SARS-CoV in 2002/2003, followed by 7) South Korea; 8) New Zealand; 9) Australia; 10) Japan; 11) Hong Kong; 12) Cyprus; 13) Greece; 14) Latvia; 15) Iceland; 16) the United Arab Emirates; 17) Czech; 18) Lithuania; 19) Norway, and 20) Estonia.

Keywords: International Rankings; Covid-19; Fatal Cases; Health; Innovation; Sustainability

1. Introduction

Since the end of 2019, the humanity is facing a new challenge, when a virus spread across the world from Asia, called by the World Health Organization (WHO, 2020) as Coronavirus disease, popularly known as Covid-19, from Severe acute respiratory syndrome coronavirus2 (SARS-CoV-2).

Nowadays, there are several sites to monitor the evolution of Covid-19, containing statistics on the number of new cases, recovered, tests, deaths, etc. Among them, there is the WHO Coronavirus Dashboard <https://bit.ly/2EhjNZN>, Covid19 Tracker <https://binged.it/2UBdRz6>, but the most dynamic are worldometers <https://bit.ly/3dpMErI>, our world in data <https://bit.ly/2Ehv0JQ> and John Hopkins University & Medicine Coronavirus Resource Center <https://bit.ly/2V6FRMp>.

Since December 31, 2019, when the first official case was announced in China, the human challenge can be seen by comparing two random periods: period 1) after 3 months (90 days), at 18:32 (GMT) on March 29, 2020, the Worldometers (2020) pointed out 710,950 confirmed cases with 33,553 fatal cases; period 2) due to Covid-19 fast transmission, after 8 months, at 23:59 (GMT) on August 31, 2020, the world has accounted for about 25,620,737 new confirmed cases with 854,222 fatal cases.

Since there is no effective vaccine or treatment against the Covid-19, each country is trying to adopt several measures to face the pandemic, to reduce its impact on its population and economy. Considering the number of total new cases, on March 29, 2020, the 10 most critical countries were the USA, Italy, China, Spain, Germany, France, Iran, UK, Switzerland, and Netherland.

In that time (March/20), Silva (2020): a) developed an international survey with sixteen countries related to the evolution of new cases of Covid-19; b) showed ten reasons by which Brazil (it was in the 19th place) could move the world; c) provided ten conclusions and recommendations, and some of them were: c1) Brazil could be among the most-affected country before the end of May 2020; c2) although no nation is prepared to face epidemics and pandemics (NTI, JHU, and EIU, 2019), among the sixteen countries investigated, Thailand, Finland, Australia, South Korea, Denmark, and Sweden are cases that Brazil could study so as not to repeat the scenarios of China, USA, Italy, and Spain; c3) the research focused only the number of new cases per day, so it was recommend a study involving the fatal cases.

To complement Silva (2020) survey, this research main aim is to develop a holistic methodology to identify twenty benchmark countries that are saving people's lives against Covid-19. The specific objectives are a) select and present international countries rating systems that take into consideration health, innovation, sustainability, image, and competitiveness; b) to select up to top fifty well-evaluated countries; c) identify the twenty best benchmark countries that are saving people lives against Covid-19.

The research is relevant: 1) for political leaders, policymakers, or managers responsible for Health Systems since they will know important ranking, and countries globally well evaluated and exceeding in fighting the Covid-19 during the first 180 days; 2) for academy it can be useful for focusing more resources and research to identify the best management practices adopted by the benchmark countries, in order to develop strategies for preventing or controlling similar epidemic or pandemic episodes in the future. Besides, although several authors have published relevant information about Covid-19 (BASHIR et *al*., 2020; CHAKRABORTY, AND MAITY, 2020; CHING, TZONG, AND HSUAN, 2020; COWLING et *al*., 2020; FLAXMAN et *al*., 2020; HA et *al*., 2020; LA et *al*., 2020; MAHATO, PAL

AND GHOST, 2020; SILVA, 2020; PRATA, RODRIGUES, AND BERMEJO, 2020; ZAMBRANO-MONSERRATE, M.A., RUANO, AND SANCHEZ-ALCALDE, 2020; YUNUS, MASAGO, AND HIJIOKA, 2020; WANG, NG, AND BROOK, 2020), there is a need to scientifically develop a methodology to recognize the benchmark countries, taking into consideration a holistic approach evaluation with the real estimated number of Covid-19 fatal cases by one million population during the first 6 months facing the pandemic.

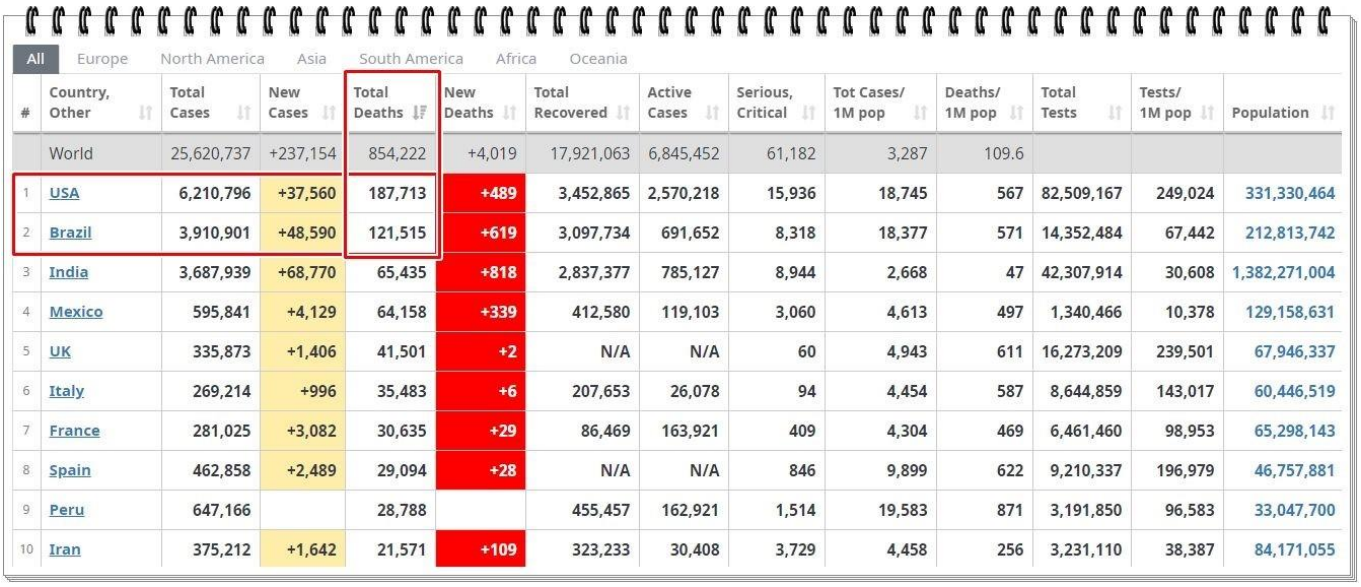
2. World Health Organization (WHO), SARS and bad examples of countries leaders

The WHO is the global guardian of public health, with more than 7000 professionals working in more than 150 countries: scientists, epidemiologists, aid specialists emergency, medical doctors, public health specialists, administrative managers, economists, financial specialists, information systems specialists, specialists in health statistics, etc. They work with over 300 topics, ranging from abortion, air pollution, asthma, biological weapons, cancer, zoonosis, but the most popular are Ebola, Nutrition, Hepatitis, and now Covid-19.

According to WHO (2012), an epidemic of Severe Acute Respiratory Syndrome (SARS-CoV) appeared in November 2002 in southern China (Guangdong province). According to WHO (2003), until August 7, 2003, it affected 8422 people from 32 countries with a total of 916 fatal cases (10,9%), most of these located in China (5327 cases; 349 deaths), Hong Kong (1755 cases; 300 deaths), Taiwan (665 cases; 180 deaths), Canada (251 cases; 41 deaths), Singapore (238 cases; 33 deaths), Vietnam (63 cases; 5 deaths), USA (33 cases; 0 death), Thailand (9 cases; 2 deaths), and Malaysia (5 cases; 2 deaths).

Since then, several authors (HOLMES, 2003; PANG, 2003; RILLEY, 2003; BELL, 2004; INSTITUTE OF MEDICINE, 2004) provided information about the virus and also tried to call the attention of the leaders about measures necessary to prevent, control and respond to future global outbreaks.

After seventeen years, the WHO Office, located in China, reported on December 31, 2019, the occurrence of people suffering from unknown pneumonia in Wuhan, located in China's Hubei Province. On February 11, 2020, WHO announced as a new virus of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) with a popular disease name as Covid-19, and almost one month later, it was announced as a pandemic. Due to its fast transmission, after 8 months (244 days) since the first official case in China, at 23:59 (GMT) on August 31, 2020, the world has accounted for about 854,222 fatal cases, with USA (187,713), Brazil (121,515), India (65,435), Mexico (64,158), UK (41,501), Italy (35,483), France (30,635), Spain (29,094), Peru (28,788), and Iran (21,571) leading with the total of fatal cases (WORLDOMETERS, 2020) as can be seen in Figure 1.



All | Europe | North America | Asia | South America | Africa | Oceania

#	Country, Other	Total Cases	New Cases	Total Deaths	New Deaths	Total Recovered	Active Cases	Serious, Critical	Tot Cases/ 1M pop	Deaths/ 1M pop	Total Tests	Tests/ 1M pop	Population
	World	25,620,737	+237,154	854,222	+4,019	17,921,063	6,845,452	61,182	3,287	109.6			
1	USA	6,210,796	+37,560	187,713	+489	3,452,865	2,570,218	15,936	18,745	567	82,509,167	249,024	331,330,464
2	Brazil	3,910,901	+48,590	121,515	+619	3,097,734	691,652	8,318	18,377	571	14,352,484	67,442	212,813,742
3	India	3,687,939	+68,770	65,435	+818	2,837,377	785,127	8,944	2,668	47	42,307,914	30,608	1,382,271,004
4	Mexico	595,841	+4,129	64,158	+339	412,580	119,103	3,060	4,613	497	1,340,466	10,378	129,158,631
5	UK	335,873	+1,406	41,501	+2	N/A	N/A	60	4,943	611	16,273,209	239,501	67,946,337
6	Italy	269,214	+996	35,483	+6	207,653	26,078	94	4,454	587	8,644,859	143,017	60,446,519
7	France	281,025	+3,082	30,635	+29	86,469	163,921	409	4,304	469	6,461,460	98,953	65,298,143
8	Spain	462,858	+2,489	29,094	+28	N/A	N/A	846	9,899	622	9,210,337	196,979	46,757,881
9	Peru	647,166		28,788		455,457	162,921	1,514	19,583	871	3,191,850	96,583	33,047,700
10	Iran	375,212	+1,642	21,571	+109	323,233	30,408	3,729	4,458	256	3,231,110	38,387	84,171,055

Figure 1: The most critical countries in terms of total deaths cases of Covid-19 on August 22, 2020
Source: Worldometers (2020)

The most critical countries (USA and Brazil) officially lost 309,228 precious lives, representing 36,20% of total reported deaths in 215 countries. Probably, most lives could have been saved if allies presidents Donald Trump and Jair Bolsonaro had not adopted the bad behaviors described in Chart 1.

BAD BEHAVIORS	SOURCES
Ignored early alerts and advises from scientists, WHO, and the intelligence	Poznansky (2020), Romano (2020), Graham (2020), Marchall (2020), CNN (2020), CNN, S.D. and I.K. (2020)
Attack WHO and don´t follow the Covid-19 Safety Protocols, sowing confusion and discouraging correct measures	The Lancet (2020), BBC News (2020), Glick (2020), McDonald et *al*. (2020), NY Times (2020), Agência Brasil (2020), and Human Right Watch (2020).
Spread more than 595 Fake News or distorted statement on Covid-19	CNN, D.D. and T.S. (2020), Statista (2020), Paz (2020), Ricard and Medeiros (2020)
Discloses and forces the use of medicines (hydroxychloroquine and chloroquine) without proven efficacy against Covid-19	News, ABC (2020), Segundo, iG Ú. (2020), Euroews (2020), and Wessel (2020)
No initiative and leadership to act early to unite and organize the country against the virus.	Armstrong (2020), Barberia and Gómez (2020), Hamilton (2020), Haltiwanger (2020), Tisdall (2020), The Lancet (2020), and Ward (2020)

Chart 1: Bad behaviors adopted by President Trump and Bolsonaro during the pandemic
Source: Author (2020)

In any crisis, society discovers the best and worst leaders. During this pandemic, the USA under Trump's leadership and Brazil under Bolsonaro's lead is very far from any good example to follow.

So, what are the best countries? How to identify them? Those are the main questions of the study.

3. The proposed holistic methodology and main results

The holistic methodology has fifteen phases divided by rankings (Figure 2 and Chart 2).

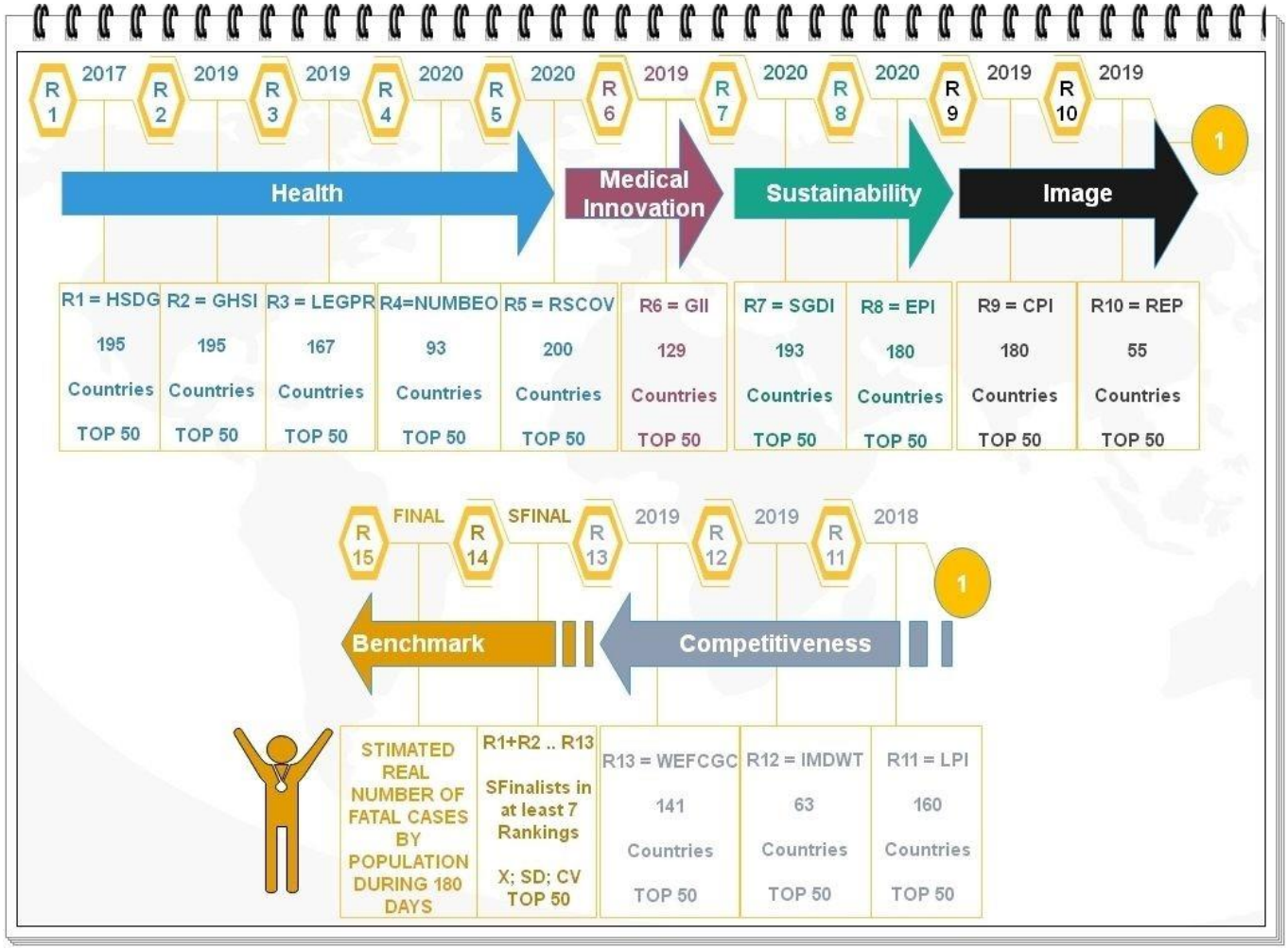


Figure 2: The model to identify the benchmark countries that are saving people lives against Covid-19
Source: Author (2020)

The research is applied, as its results and recommendations are useful for academy, government policymakers and authorities. It is descriptive, with a qualitative and quantitative approach, based on bibliographic and documentary research, involving the study of official sites, articles, reports, manuals, and other technical documents related to 13 international rankings.

The first thirteen phases are composed by international ranking chosen by the following criteria: first) evaluated at least 50 countries; second) be related with health, innovation, sustainability, image, and competitiveness issues; third) use a score scale from 0 to 100 points or another numerical scale (0 to 1000; 1 to 5) that permit to be normalized to a scale from 0 to 100 points; fourth) has been realized in the last four year, giving preference to the last updated assessment.

The Chart 2 summarizes the profile of the thirteen international rankings investigated, showing the code, the dimension, the name of the report, the number of countries evaluated, the term country is used

to refer the territories included in each ranking, also shows the year, score range, it was necessary to normalize the score and the source.

In short, from ranking one until ranking 13, in each of them, it was selected the top 50 highest score countries, all of them written in a spreadsheet.

After that, a total of 108 countries were to the semifinal rank, where the average score, standard deviation, coefficient variation, and median were applied for each country, generating a list of 44 wellevaluated countries that were present in at least seven of the investigated rankings.

RANK	CODE	HEALTH	NAME	NC	YEAR	SCORE	SOURCES
R1	HRSDGI17		Health-related SDG Index	195	2017	0-100	GBD 2017 SDG Collaborators (2018)
R2	GHSI19		Global Health Sec. Index	195	2019	0-100	NTI, JHU and EIU (2019)
R3	LPI19		The Legatum Prosperity Index (Pillar 10 Health)	167	2019	0-100	Legatum Institute (2019)
R4	NHCI20		NUMBEO Health Care Index	93	2020	0-100	Numbeo (2020)
R5	RSCOV20		Covid-19 Regional Safety Assessment	200	2020	0-1000*	Deep Knowledge Group (2020)
R6	GII19	MEDICAL INNOVATION	Global Innovation Index	129	2019	0-100	Cornell Univ., INSEAD, and WIPO (2020)
R7	SDGI20	SUSTAINABILITY	The SDG and Covid-19	193	2020	0-100	Sachs et al. (2020)
R8	EPI20		Environment Performance Index	180	2020	0-100	Wendling et al. (2020)
R9	CPI19	IMAGE	Corruption	180	2019	0-100	E.V, T. I. (2020)

			Perception Index				
R10	REP19		Country Reputation Track	55	2019	0-100	Reputation Inst. (2019)
R11	LPI18		Logistic Performance Index	160	2018	1 – 5 **	The World Bank (2018)
R12	IMDWT19		IMD World Talent	63	2019	0-100	IMD World Competitiveness Center (2019)
R13	WEFGCI19		The Global Competitiveness Index	141	2019	0-100	Schawb (2019)

Chart 2: Profile of the thirteen international rankings

Note: * and * * scores needed to be normalized for 0 to 100 points

And finally, for each of the 44 semi-finalists, it was used the concept of Fatality Total Index (FTI) to estimate real number of fatal cases by the one million population during 180 (6 months) days facing the pandemic. The collection and analysis methods used in each ranking are described with more details with the main results in the next sections.

3.1 Ranking 1: Health-related Sustainable Development Goal Index (HRSDGI) 2017

Since September of 2015, 193 leaders of all UN Members adopted The Sustainable Development Goals (SDG) to fight poverty, protect the planet and ensure that all people enjoy peace and prosperity by using the 2030 Agenda for Sustainable Development (UNDP, 2016a).

The 2030 Agenda focus on seventeen SDGs, 169 targets, and 232 indicators covering economic, environmental, and social dimensions, from (1) No poverty until (17) Partnerships for the Goals (UNDP, 2016a). Besides, to help each country to implement and measure the progress towards the SDGs, the United Nations Development Programme (UNDP) has offered several tools, guidance, resources, and methodologies (UNDP, 2016b; UNDP, 2017; UNDP, 2020; UNDP, n.d).

In terms of Health, the closest goal of SDG is number 3, related to Good Health and Well-Being to ensure healthy lives and promote well-being for all at all ages. Besides, concerning to measurement or assessment, since 2015, some methodologies tried to evaluate the HRSDGs (WHO,2016; SACHS et al., 2016; GBD 2015 SDG Collaborators; 2016) with improvement in the last years (GBD 2017 SDG COLLABORATORS, 2018; SACHS et al., 2020).

According to GBD 2015 SDG Collaborators (2016 p. 1839), there are are several important similarities and differences between their assessment of the HRSDGs and those produced by WHO (2016)

and the Sustainable Development Solutions Network (SACHS et al., 2016), especially because they focused more on the HRSDG indicators and did not cover indicators across all SDG goals as Sachs et al. (2016) did.

Historically, The Global Burden of Diseases, Injuries, and Risk Factors Study (GDB) 2015 estimated 33 HRSDG indicators and overall HRSDG Index from 1990 to 2015 for 188 countries. In GDB 2016, the number of indicators was expanded to 36, and projections of HRSDG achievement in 2030 were estimated for the first time. Finally, the GDB 2017 measured the progress of 40 HRSDG indicators from 1990 to 2017 (Figure 3), reason by which the GBD 2017 SDG Collaborators (2018) methodology was chosen to become the Ranking 1.

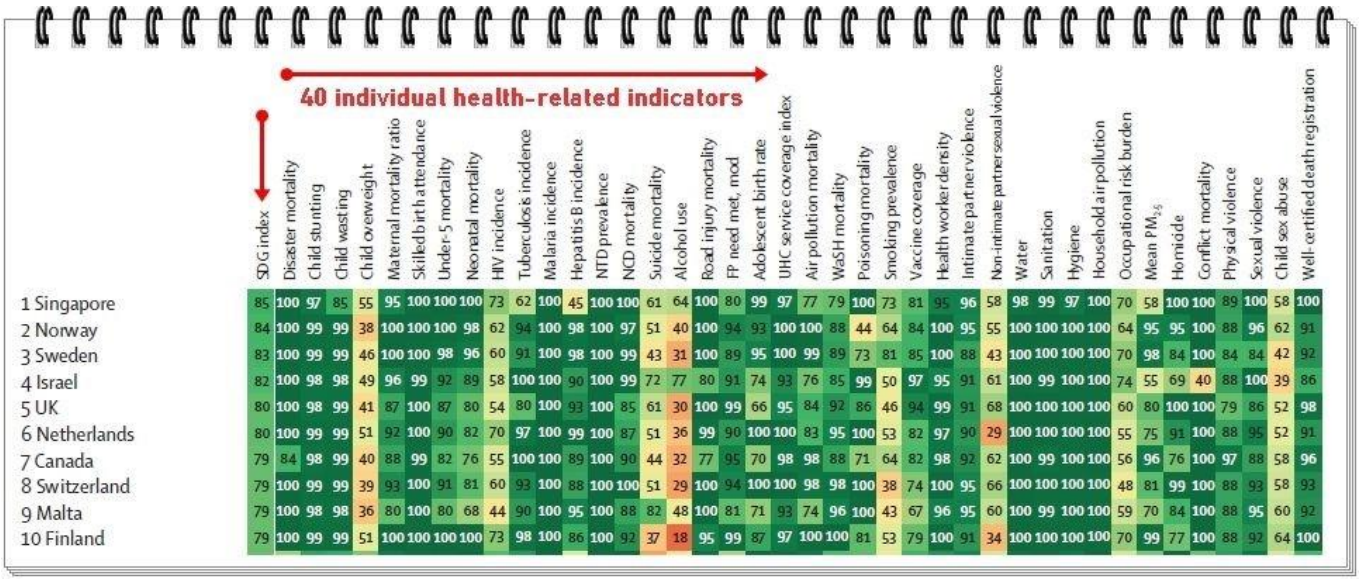


Figure 3: Ten best countries performance on the health-related SDG Index, in 2017. Source: GBD 2017 SDG Collaborators (2018 p. 2104)

HRSDG indicators are indicators for health services, health outcomes, and environmental, occupational, behavioral, and metabolic risks with well-established causal connections to health (GBD 2015 SDG COLLABORATORS; 2016 p. 1815).

The overall index for GBD 2017 consisted of 40 HRSDG indicators (Figure 3) from 195 countries, the value for each indicator was transformed on a scale of 0–100, with 0 as the 2·5th percentile and 100 as the 97·5th percentile of 1000 draws calculated from 1990 to 2030. It was calculated the geometric mean of scaled health-related SDG indicators by the target and then took the geometric mean across all HRSDG targets to produce the overall HRSDG index.

GDB 2017 SDG Collaborators (2018) provides further information about the methodology, methods, indicators, standardization, and other details about the calculation of SDG Index and the median values used for this article were taken from Figure 1 (GDB 2017 SDG COLLABORATORS, 2018, page 2014 – 2016) related to the performance on the HRSDG Index and 40 individual health-related indicators, by location, in 2017.

As a result, in 2017, the global median HRSDG index was 59.4 and the ten best countries (Figure 3) were: 1) Singapore (85 points); 2) Norway (84); 3) Sweden (83); 4) Israel (82); 5) UK (80); 6) Netherlands (80); 7) Canada (79); 8) Switzerland (79); 9) Malta (79) and 10) Finland (79).

Finally, the HRSDGs Index of each country can be easily accessed by using the interactive Viz Hub platform <https://vizhub.healthdata.org/sdg/> developed by the IHME from the University of Washington.

3.2 Ranking 2: Global Health Security Index (GHSI) 2019

The GHSI 2019 was published last year (NTI, JHU, and EIU, 2019) and presents the global assessment of the health security capacity of 191 countries, based on a questionnaire with 140 questions divided into 6 categories, 34 indicators, and 85 sub-indicators.

The six main categories are:

1) prevention (emergency prevention or pathogen release);
2) detection and reporting (detection and early notification of epidemics of international interest);
3) rapid response (rapid response and mitigation of the spread of an epidemic);
4) health system (robust health system to treat patients and protect health professionals);
5) compliance with international standards (commitment to improving national capacity, finance plans to fill gaps and adhere to international standards);
6) environmental risk (risk of the general environment and the country's vulnerability to biological threats).

The GHSI 2019 <https://www.ghsindex.org/> methodology is described in the Report of NTI, JHU, and EIU (2019 p. 61) and the overall score (0 – 100) for each country is a weighted sum of the six categories. Each category is scored on a scale from 0 to 100, in which 100 represents the most favorable health security conditions, and 0 means the least favorable.

In short, the report:

a) reveals that the overall average of the GHSI 2019 of 195 countries is 40.2 points;
b) point out that health security is fundamentally weak on the planet, no country is fully prepared to face epidemics and pandemics, and each country has gaps to be resolved;
c) points out 33 recommendations, among them related to the health security capacity of eachcountry, needs to be transparent and regulated;
d) the average score for the indicated Health System is 26.4, being considered the category withthe lowest score;
e) transparency and trust are vital elements in preparing for the pandemic;
f) the ten countries (Figure 4) with the best overall scores were: 1) USA (83.5); 2) UK (77.9); 3) Netherlands (75.6); 4) Australia (75.5); 5) Canada (75.3); 6) Thailand (73.2); 7) Sweden (72.1); 8) Denmark (70.4); 9) South Korea (70.2) and Finland (68.7).

OVERALL SCORE			1. PREVENTION OF THE EMERGENCE OR RELEASE OF PATHOGENS			2. EARLY DETECTION & REPORTING FOR EPIDEMICS OF POTENTIAL INTERNATIONAL CONCERN			3. RAPID RESPONSE TO AND MITIGATION OF THE SPREAD OF AN EPIDEMIC		
Rank		Score	Rank		Score	Rank		Score	Rank		Score
1	United States	83.5	1	United States	83.1	1	United States	98.2	1	United Kingdom	91.9
2	United Kingdom	77.9	2	Sweden	81.1	2	Australia	97.3	2	United States	79.7
3	Netherlands	75.6	3	Thailand	75.7	2	Latvia	97.3	3	Switzerland	79.3
4	Australia	75.5	4	Netherlands	73.7	4	Canada	96.4	4	Netherlands	79.1
5	Canada	75.3	5	Denmark	72.9	5	South Korea	92.1	5	Thailand	78.6
6	Thailand	73.2	6	France	71.2	6	United Kingdom	87.3	6	South Korea	71.5
7	Sweden	72.1	7	Canada	70.0	7	Denmark	86.0	7	Finland	69.2
8	Denmark	70.4	8	Australia	68.9	7	Netherlands	86.0	8	Portugal	67.7
9	South Korea	70.2	9	Finland	68.5	7	Sweden	86.0	9	Brazil	67.1
10	Finland	68.7	10	United Kingdom	68.3	10	Germany	84.6	10	Australia	65.9

Figure 4: The ten best countries in the GHS Index 2019
Source: NTI, JHU and EIU (2019 p. 20)

3.3 Ranking 3: The Legatum Prosperity Index (LPI) 2019

The LPI 2019 goal is to provide the most effective data tool for political leaders, policymakers, business leaders, investors, philanthropists, media, and civil society to help set the agendas and implement strategies for social and economic development that will further create the pathways from poverty to prosperity for all nations (LEGATUM PROSPERITY, 2019 p. 82).

It has been refined, and for the version 2019 (13th consecutive year), 167 countries (99.4% of the global population) were evaluated by using 3 Domains, 12 pillars, 65 elements and hearing more than 100 academics and experts around the world with particular expertise on each pillar: P1) Safety & Security; P2) Personal Freedom; P3) Governance; P4) Social Capital; P5) Investment Environment; P6) Enterprise Conditions; P7) Market Access; P8) Economic Quality; P9) Living Condition; P10) Health; P11) Education; P12) Natural Environment.

The methodology is described in the Report of Legatum Prosperity (2019, p. 80-82) and here <https://www.prosperity.com/about/resources> it is possible to download the full data set in Microsoft format to understand that the overall score (0 – 100) for each country is the average of the 12 pillars (each one has the same weight). Besides, each pillar is also scored on a scale from 0 to 100, in which 100 represents the highest value, and 0 means the lowest value.

For this research, only the Pillar 10 (Health) is considered (Figure 5), composed by six elements: Behavioral Risk Factors (weight 10%), Care Systems (15%), Longevity (30%), Mental Health (10%), Physical Health (20%), and Preventive interventions (15%), which measures the extent to which people are healthy and have access to the necessary services to maintain good health.

According the Legatum Prosperity (2019, p. 72), those who enjoy good physical and mental health report high levels of well being, whilst poor health provides a major obstacle to people fulfilling their potential. The coverage and accessibility of effective healthcare, combined with behaviors that sustain a healthy lifestyle, are critical to both individual and national prosperity. As a result, the global average score (167 countries) of Pillar 10 (Health) is 68.28 (S=11; CV=0.17; Mean=71.81) and the ten best countries (Figure 6) in this pillar were: 1) Singapore (86.6); 2) Japan (86.3); 3) Switzerland (84.2); 4) South Korea

(84;2); 5) Norway (83.4); 6) Hong Kong (83;1); 7) Iceland (82.8); 8) Denmark (82.8); 9) Netherlands (82.6); and 10) Austria (82,5). When comparing the score by the element, between 2009 and 2019, the elements with more improvements were Preventive interventions, Care Systems and Longevity, while Mental Health and Physical Health showed slight negative evolution.

Figure 5: Domains, Pillars and Elements of the Legatum Prosperity Index 2019
Source: Legatum Prosperity (2019, p. 35)

COUNTRY												
PILLAR WEIGHTING	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1
Singapore	91.95	51.99	75.28	63.69	87.71	87.02	84.81	79.70	95.61	86.63	90.69	54.68
Japan	91.50	72.14	80.56	44.45	78.31	83.02	74.79	67.03	93.58	86.25	86.46	66.55
Switzerland	93.97	85.98	87.35	72.42	78.71	88.17	78.15	79.56	96.36	84.16	85.69	73.20
South Korea	82.22	64.41	70.33	42.48	76.82	70.80	73.71	73.38	91.56	84.16	89.44	57.16
Norway	93.84	94.56	90.38	77.49	83.29	83.54	74.77	73.17	95.84	83.37	85.99	71.27
Hong Kong	92.96	66.90	81.25	58.90	81.94	90.78	81.75	73.88	94.50	83.10	87.57	65.31
Iceland	92.72	89.05	84.30	74.52	73.10	75.04	76.65	70.64	93.43	82.82	85.28	71.08
Denmark	92.93	92.88	88.97	77.14	81.14	84.44	77.81	74.02	97.08	82.76	87.84	70.50
Netherlands	91.27	89.73	88.72	73.28	78.92	84.36	80.38	74.72	96.94	82.62	86.41	58.92
Austria	91.53	83.51	82.95	67.72	79.00	79.85	74.32	68.44	94.55	82.51	83.01	75.69

Figure 6: The ten best countries in the Pillar 10 (Health) of the Legatum Prosperity Index 2019
Source: Legatum Prosperity <https://www.prosperity.com/rankings>

3.4 Ranking 4: Numbeo Health Care Index (NHCI) 2020

It has been published since 2012, and nowadays, new evaluations are made every semester, by applying a survey to the visitors of the Numbeo (2020) website and using a scale from 0 to 100. To generate the index, Numbeo (2020) uses data up to 36 months old and the Health Care Index is an estimation of the overall quality of the health care system, health care professionals, doctors, cost, equipment, staff, etc. By using the scores of Numbeo (2020) 93 countries, it is possible to note that the average score is 63.14 (S=10.31; CV=0.16; Mean=64.48) and the ten best countries were: 1) Taiwan (86.71); 2) South Korea (81.97); 3) Japan (81.14); 4) Denmark (80); 5) France (79.99); 6) Spain (78.88); 7) Austria (78.73); 8) Thailand (77.95); 9) Australia (77.8); and 10) Finland (75.79).

3.5 Ranking 5: Covid-19 Regional Safety Assessment 2020

The Covid-19 Regional Safety Assessment 2020 Report is one of several reports published by Deep Knowledge Group (2020) about the Covid-19 situation around the world. According to Deep Knowledge Group (2020, p. 70), this report is designed to classify, analyze and rank economic, social, and health stability achieved in 200 regions, countries, and territories, by dividing them into 4 different Tiers:

Tier 1 with 20 countries and 130 parameters, ranked highest in terms of regional safety and stability; Tier 2 has 20 regions with 60 parameters; Tier 3with 60 regions with 60 parameters; and Tier 4 with 100 regions that scored least favorably during a first-phase analysis, which suffer from a high level of data unavailability, reason by which is used only 40 parameters.

The framework has six top-level categories (Figure 7) called: 1) Quarantine Efficiency (Weight=2.2); 2) Government Efficiency of Risk Management (Weight=2.2); 3) Monitoring and Detection(Weight=1.5); 4) Health Readiness (Weight=1.3); 5) Regional Resilience (Weight=1.3); and 6) Emergency Preparedness (Weight=1.5). The explanation of this methodology is long and can be studied from page 69 until 116 of the report (DEEP KNOWLEDGE GROUP, 2020).

Figure 7: Example of the categories, indicators, weight used to calculate the total score. Source: Deep Knowledge Group (2020, p.136)

In short, each category has a score point that uses a scale from 0 to 100, which is multiplied by a weight and later summed with other categories score point, generating a cumulative score from 0 to 1000. Figure 7 shows the case of Switzerland, the best country in this rank with a total of 752 points.

For the Deep Knowledge Group (2020, p. 118) the most critical factors impacting regional safety is not the general level of different region's theoretical capacity to withstand and neutralize national emergencies, but rather the specific policies and crisis management strategies and tactics they employ. In June, 2020, the ten best countries are: 1) Switzerland (752 points); 2) Germany (749); 3) Israel (748); 4) Singapore (744); 5) Japan (738); 6) Austria (726); 7) China (717); 8) Australia (716); 9) New Zealand (715); and 10) South Korea (712). It is important to note that for this study, the total score point (0 – 1000) will be divided by ten to generate a total score normalized from 0 to 100.

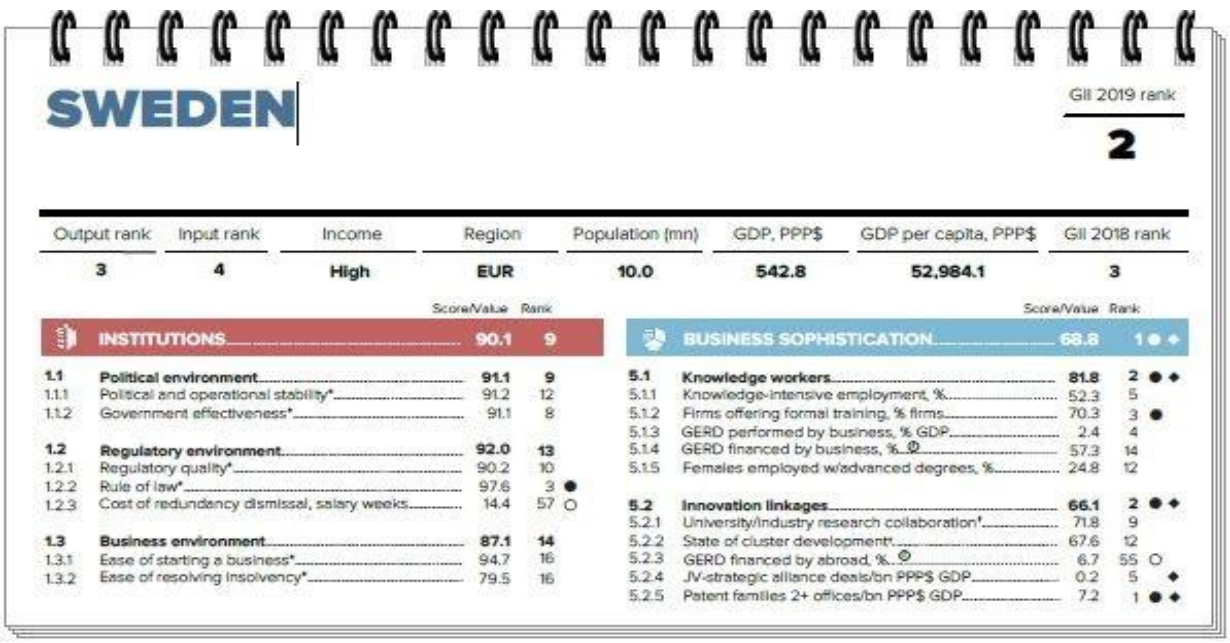
3.6 Ranking 6: Global Innovation Index (GII) 2019

Since 2007, The collaborators of Cornell University, INSEAD, and WIPO (2019) realize the GII, to provide insightful data on innovation and, in turn, to assist economies in evaluating their innovation performance and making informed innovation policy considerations. Every year around 130 countries are evaluated by using a theme, and for the 12th edition, 2019, the theme is “Creating Healthy Lives – The Future of Medical Innovation”.

The GII 2019 evaluated 129 countries/economies (91.8% of the world population) and its Framework focus on two sub-index called Innovation Input Sub-Index and Innovation Output Sub-Index, with seven pillars:

Innovation Input Sub-Index: P1) Institutions (Political environment, Regulatory environment, and Business environment); P2) Human Capital and Research (Education, Tertiary education, R & D); P3) Infrastructure (ICTs, General infrastructure, Ecological sustainability); P4) Marketing sophistication (Credit, Investment, Trade, compensation, and market scale); P5) Business sophistication (Knowledge workers, Innovation linkages, and Knowledge absorption);

Innovation Output Sub-Index: P6) Knowledge and technology outputs (Knowledge creation, Knowledge impact, and Knowledge diffusion); P7) Creative outputs (Intangible assets, Creative goods and services, and Online creativity).



SWEDEN

GII 2019 rank 2

Output rank	Input rank	Income	Region	Population (mn)	GDP, PPP$	GDP per capita, PPP$	GII 2018 rank
3	4	High	EUR	10.0	542.8	52,984.1	3

		Score/Value	Rank
	INSTITUTIONS	**90.1**	**9**
1.1	**Political environment**	**91.1**	**9**
1.1.1	Political and operational stability*	91.2	12
1.1.2	Government effectiveness*	91.1	8
1.2	**Regulatory environment**	**92.0**	**13**
1.2.1	Regulatory quality*	90.2	10
1.2.2	Rule of law*	97.6	3 ●
1.2.3	Cost of redundancy dismissal, salary weeks	14.4	57 ○
1.3	**Business environment**	**87.1**	**14**
1.3.1	Ease of starting a business*	94.7	16
1.3.2	Ease of resolving insolvency*	79.5	16

		Score/Value	Rank
	BUSINESS SOPHISTICATION	**68.8**	**1 ● ◆**
5.1	**Knowledge workers**	**81.8**	**2 ● ◆**
5.1.1	Knowledge-intensive employment, %	52.3	5
5.1.2	Firms offering formal training, % firms	70.3	3 ●
5.1.3	GERD performed by business, % GDP	2.4	4
5.1.4	GERD financed by business, %	57.3	14
5.1.5	Females employed w/advanced degrees, %	24.8	12
5.2	**Innovation linkages**	**66.1**	**2 ● ◆**
5.2.1	University/industry research collaboration†	71.8	9
5.2.2	State of cluster development†	67.6	12
5.2.3	GERD financed by abroad, %	6.7	55 ○
5.2.4	JV-strategic alliance deals/bn PPP$ GDP	0.2	5 ◆
5.2.5	Patent families 2+ offices/bn PPP$ GDP	7.2	1 ● ◆

Figure 8: Partial view of the Sweden indicators
Source: Cornell University, INSEAD and WIPO (2019, p. 328)

The Methodology, data, and changes in the last version are explained by Cornell University, INSEAD, and WIPO (2019, p. 367-374) and scores at all levels until 80 indicators are normalized in the 0 to 100 range. The overall score is the average of the input and output sub-index scores, and for each country, they published a short report with the rank and all indicators (Figure 8).

One of the main findings of the report is that to create healthy lives through medical innovation requires more investment in innovation and increased diffusion efforts.

And the ten best countries/economies in 2019 were:1) Switzerland (67.24); 2) Sweden (63.25); 3) USA (61.73); 4) Netherlands (61.44); 5) UK (61.3); 6) Finland (59.83); 7) Denmark (58.44); 8) Singapore (58.37); 9) Germany (58.19); and 10) Israel (57.43).

3.7 Ranking 7: The Sustainable Development Goals Index (SDGI) and Covid-19

The SDGI Report has been published since 2015, it is the first global survey to evaluate each country concerning achieving the SDGs. It is also well known as SDG Index Report and Dashboards, and the version of last June 2020, is useful because also brings much information about Covid-19.

According to Sachs et al. (2020, p. 24-25), in this last version, the SDGI tracks 166 country performance on the 17 SDGs, as agreed by the international community in 2015 with equal weight to all 17 goals. The score signifies a country's position between the worst (0) and the best or target (100) outcomes, and the methodology has been peer-reviewed (SCHMIDT-TRAUB et al., 2017) and was audited by the European Commission Joint Research Centre (PAPADIMITRIOU, NEVES, and BECKER, 2019).

As a result, the 2020 SDGI ten best countries are: 1) Sweden (84.7); 2) Denmark (84.6); 3) Finland (83.8); 4) France (81.1); 5) Germany (80.8); 6) Norway (80.8); 7) Austria (80.7); 8) Czech (80.6); 9) Netherlands (80.4); and 10) Estonia (80.1). It terms of meaning, that the best country (Sweden) overall

Index score (84.7) suggests that the country is on average 85% of the way to the best possible outcome across the 17 SDGs.

3.8 Ranking 8: Environmental Performance Index (EPI) 2020

Some authors tried to call the attention of the authorities about the increasing of people vulnerability to the coronavirus due to environmental pollution issues (CUI et *al*, 2003; WATTS, 2003; KAN et *al.*, 2005), this is why a ranking specially dedicated to evaluating countries on an environmental issue is part of the methodology.

Since 2006, The EPI has been published and the 2020 version provides a data-driven summary of the state of sustainability around the world by using 32 performance indicators across 11 issue categories (example: air quality, sanitation & drinking water, waste management, etc), to rank 180 countries on environmental health and ecosystem vitality (WENDLING et *al*, 2020, p. 2).

According to Wendling et *al*. (2020, p. 2), the metrics of 2020 ranking are from a variety of sources and represent the most recent data, often from 2017 or 2018, reason by which, the analysis does not reflect recent developments, including the dramatic drop in air pollution in 2020 due to the COVID19 pandemic or the greenhouse gas emissions from the extensive Brazil Amazonian fires in 2019.

Each indicator has a scale from 0 to 100 scale, from worst to best performance. For each country, it was weighed and aggregated the scores for indicators into issue categories, policy objectives, and then, finally, into an EPI score.

By using the report and also the material available in this site <https://epi.yale.edu/downloads> it was possible to download the spreadsheet to identify that the global average score of 180 countries is 48.26 (S=17.03; CV = 0.35; Median = 48) and that the best ten countries are: 1) Denmark (82.5); 2) Luxembourg (82.3); 3) Switzerland (81.5); 4) UK (81.3); 5) France (80); 6) Austria (79.6); 7) Finland (78.9); 8) Sweden (78.7); 9) Norway (77.7); and 10) Germany (77.2).

3.9 Ranking 9: Corruptions Perceptions Index (CPI) 2019

One of the principles of the GHS Index 2019 is that transparency and trust are vital elements in preparing for the pandemic. Shared Transparency, data publicity is needed to draw a more comprehensive and reproducible picture of global gaps related to preparedness (NTI, JHU, and EIU, 2019 p. 34). One of the international ranking that evaluates the level of perception of a sample of the population with its leaders is carried out annually in 180 countries, called “Corruption Perceptions Index - CPI”, published by Transparency International <https://www.transparency.org/>.

The last report was CPI 2019 with 34 pages and its methodology aggregates data from different sources that allow evaluating on a scale from 0 to 100, the perception of specialists and entrepreneurs with the level of corruption in the public sector, where 100 points mean that the country is very clean, while 0 point means that the region is highly corrupt (E.V, T.I., 2019, p.4).

In short, this report points out that: a) the average score for all countries was 43 points; b) 2/3 of the countries had points below 50; c) the ten most transparent countries are: 1) Denmark (87 points); 2) New Zealand (87); 3) Finland (86); 5) Singapore (85); 6) Sweden (85); 7) Switzerland (85); 8) Norway (84); 9) Germany (80); and 10) Luxembourg (80).

3.10 Ranking 10: Country Reputation Track (REP) 2019

This rank has been published by Reputation Institute, which believes that countries with a good reputation: a) welcome more tourists; b) increase export; c) improve diplomacy; d) attract foreign direct investment; e) attract foreign knowledge and talent.

According to Reputation Institute (2019, p. 7), the REP 2019 evaluated 55 countries considered with the largest economies by GDP, with a period of data collection from march until April 2020 with a sample with more than 30000 general public consumers from 23 countries, including nations from old G8. They were asked about their perceptions of both their own country and others (up to a maximum of 2 countries per respondent). In addition, the rank evaluates dimensions and variables as bellow:

1) Quality of Life (38,2%): friendly and nice people (W=8.7); natural environment (7.2); life style(7.1); leisure and entertainment (W=6.9);
2) Institutional Quality (37%): security (W=7.5); ethic and transparency (W=6.8); internationalrespect (W=6.5); institutional and policy environment (W=6); social well-being (W=5.8); efficient use of resources (W=5.7); economic environment (W=4.8);
3) Development Level (24,7%): educated and confident people (W=5.1); culture (W=4.9); productand services quality (W=5); educational system (W=4.3); brand and companies recognized (W=4.2); technology and innovation (W=3.4).

The methodology is explained in the Reputation Institute (2019, p. 7-10) report, which used a scale from 1 to 100 to identify the total score of each nation. As a result, the global average is 61 points and ten most reputable countries in 2019 are: 1) Sweden (83.9); 2) Switzerland (83.9); 3) Norway (82.6); 4) Finland (82); 5) New Zealand (81.8); 6) Canada (79.7); 7) Denmark (79.3); 8) Australia (79.2); 9) Netherlands (79.2); and 10) Japan (76.3).

3.11 Ranking 11: Logistic Performance Index (LPI) 2018

The logistical speed is important not during common times, but when a nation face pandemic, this is why this rank was selected, developed by The World Bank (2018), which scores countries to identify how efficient they move well across and within borders.

The LPI 2018 evaluated 160 countries by using a worldwide online survey (qualitative) of operators of global freight forwarders and express carriers. Also, the feedback of the operators is supplemented with quantitative data from the performance of key components of the logistic chain in the country.

The LPI Methodology can be accessed here <https://bit.ly/2Z736b0> and it evaluates six core components of logistic performance: efficiency of customs, Infrastructure, International Shipments, Logistics quality and competence, tracking and tracing, and Timeliness.

At the final, for each country, a score from 1 to 5 is given and the global score average is 2.87 and the best 10 countries of LPI 2018 are: 1) Germany (4.20); 2) Sweden (4.05); 3); Belgium (4.04); 4) Austria (4.03); 5) Japan (4.03); 6) Netherlands (4.02); 7) Singapore (4.00); 8) Denmark (3.99); 9) UK (3.99); and 10) Finland (3.97).

For each country, to convert the Score 1 (1 – 5) to a normalized Score 2 (1 to 100), the highest score from Germany (4.2) was considered as the maximum point and it was used the formula (1):

(1) Score 2 = [(Score1 – 1) * 100] / (4.2 – 1)

For the calculation, the data of all 160 countries were taken from a spreadsheet available here <https://lpi.worldbank.org/>. As a result, the global score average is 58.28 and the Chart 2 shows the Score 2 normalized of the ten best countries: 1) Germany (100); 2) Sweden (95.36); 3); Belgium (94.93); 4) Austria (94.52); 5) Japan (94.51); 6) Netherlands (94.31); 7) Singapore (93.59); 8) Denmark (93.45); 9) UK (93.30); and 10) Finland (92.74).

Rank	Country	Score1	Score 2	Customs	Infrastructure	Int. shipments	Log. quality&comp	Tracking and tracing	Timeliness
1	Germany	4,20	100,00	4,09	4,37	3,86	4,31	4,24	4,39
2	Sweden	4,05	95,36	4,05	4,24	3,92	3,98	3,88	4,28
3	Belgium	4,04	94,93	3,66	3,98	3,99	4,13	4,05	4,41
4	Austria	4,03	94,52	3,71	4,18	3,88	4,08	4,09	4,25
5	Japan	4,03	94,51	3,99	4,25	3,59	4,09	4,05	4,25
6	Netherlands	4,02	94,31	3,92	4,21	3,68	4,09	4,02	4,25
7	Singapore	4,00	93,59	3,89	4,06	3,58	4,10	4,08	4,32
8	Denmark	3,99	93,45	3,92	3,96	3,53	4,01	4,18	4,41
9	UK	3,99	93,30	3,77	4,03	3,67	4,05	4,11	4,33
10	Finland	3,97	92,74	3,82	4,00	3,56	3,89	4,32	4,28

Chart 2: The ten best countries of the LPI 2018
Source: LPI (2018)

3.12 Ranking 12: IMD World Talent Ranking 2019

According to the IMD World Competitiveness Center (2019, p. 3), this rank evaluates 63 economies to identify the extent to which economies develop, attract, and retain highly-skilled professionals. Basically, 32 criteria are evaluated inside of these 3 factors:

F1) the Investment & Development factor measures the resources committed to cultivating homegrown human capital. Some criteria are total public expenditure on education, government expenditure on education per student, employee training, health infrastructure, etc;

F2) the Appeal factor evaluates the extent to which a country attracts local and foreign talent. Some criteria are: cost-of-living index, worker motivation, quality of life, exposure to particle pollution, attracting and retaining talents, etc;

F3) the Readiness factor quantifies the quality of the skills and competencies that are available in a country. Some criteria are labor force growth, skilled labor, competent senior managers, graduates in science, education assessment (PISA), etc.

The methodology is presented in IMD World Competitiveness Center (2019, p. 98-104) Report, and all factors are normalized for an overall ranking to the 0 to 100 range to facilitate the interpretation of results. For each country, there is a report containing the overall performance score, the score of each factor and criteria, triangles indicating improvement or declining status, the position, etc.

As a result, the ten best countries are: 1) Switzerland (100); 2) Denmark (90.80); 3) Sweden (86.94); 4) Austria (86.91); 5) Luxembourg (86.65); 6) Norway (85.95); 7) Iceland (85.15); 8) Finland (83.14); 9) Netherlands (81.81); and 10) Singapore (81.80).

3.13 Ranking 13: The Global Competitiveness Index (GCI) 2019

This last edition of The Global Competitiveness Report series, first launched in 1979, features the Global Competitiveness Index 4.0 (GCI 4.0) with the main aim to help policy-makers, business leaders and other stakeholders shape their economic strategies in the era of the Fourth Industrial Revolution.

Basically, 141 economies (99% of the world`s GDP) are evaluated by using a full set of factors that determine productivity, growth, and human development. These are organized into 12 main drivers of productivity or pillars (Figure 9): Institutions; Infrastructure; ICT adoption; Macroeconomic stability; Health; Skills; Product market; Labour market; Financial system; Market size; Business dynamism; and Innovation capability (SCHAWB 2019, p. 7).

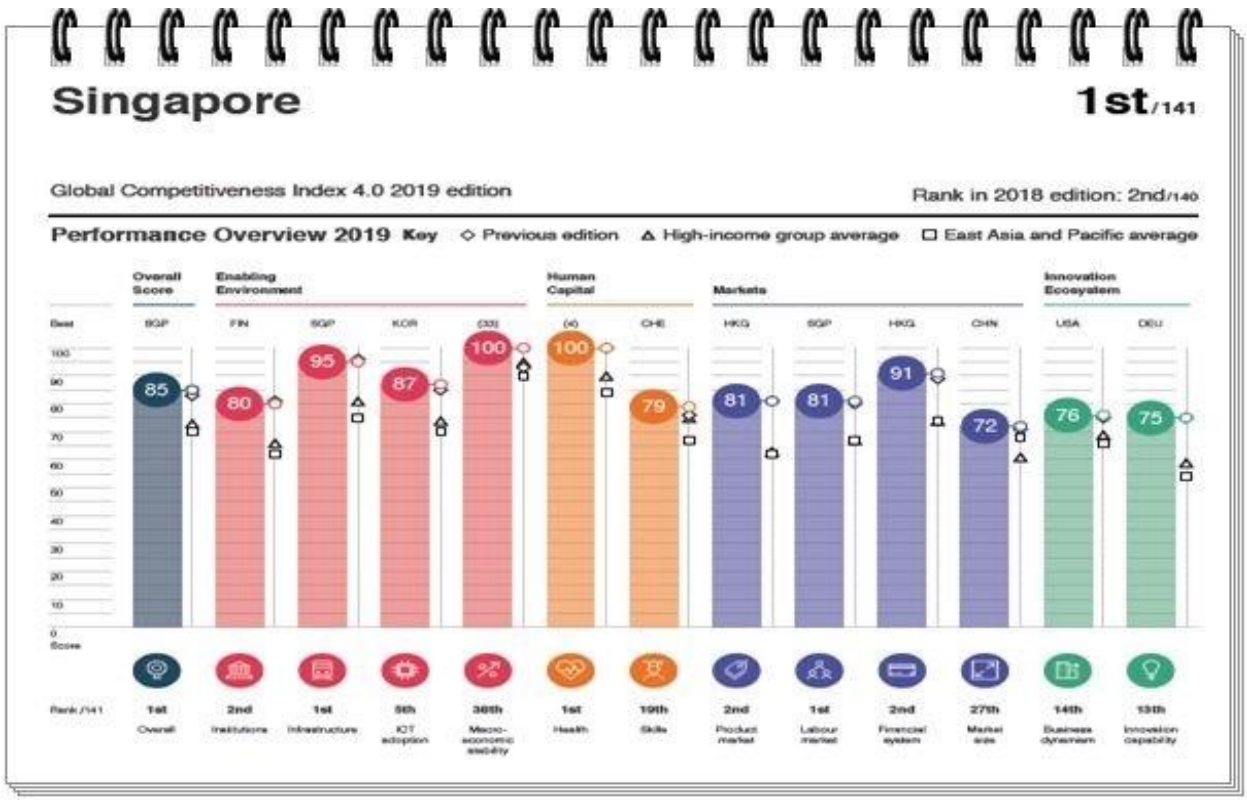


Figure 9: Part of the report showing Singapore performance
Source: Schawb (2019, p. 506-509)

The methodology (SCHAWB 2019, p. 611-639) uses a combination of data from international organizations and the World Economic Forum`s business executive (15,000) surveys.

The overall GCI 4.0 score is the average of the scores of the 12 pillars (total of 103 indicators). Each country overall performance can be between 0 to 100 score, where the maximum point means the ideal state where an issue ceases to be a constraint to productivity growth.

Also, there is a report for each economy showing the position comparing with 141 economies, the overall score, the score of each pillar, and other results described with detail.

As a result, the ten best economies of GCI 4.0 2019 are: 1) Singapore (84.8, Figure 9); 2) USA (83.7); 3) Hong Kong (83.1); 4) Netherlands (82.3); 5) Switzerland (82.3); 6) Japan (82.3); 7) Germany (81.8); 8) Sweden (81.2); 9) UK (81.2); and 10) Denmark (81.2).

3.14 Ranking 14: The Semifinalist

The Semifinalists are those countries with the highest performance, identified as belonging in at least seven rankings (54% of thirteen positions).

It was developed two spreadsheets to identify them: the first one (Chart 3) contains the position of each country in each one of 13 rankings. The goal was to identify the number of a country's participation in all 13 rankings (NP13R), taking into consideration the 50 top best nations; the second one contains the score value of each nation in each ranking, to be able to make the calculations of the Average (X), Standard Deviation (S), Coefficient of Variation (CV), and Median (Med).

As a result, a total of 108 countries (Chart 3 and Appendix A) were identified as belonging in at least one of the 13 rankings.

R	COUNTRY	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	NP13R
1	Albania	70	39	69	77	88	83	68	62	106	-	88	-	81	1
2	Algeria	48	173	73	74	93	113	56	84	106	46	117	-	89	2
3	Argentina	52	25	46	31	62	73	51	54	66	29	61	48	83	5
4	Armenia	43	44	67	-	81	64	75	53	77	-	92	-	69	2
5	Australia	27	4	18	9	8	22	37	13	12	8	18	16	16	13
6	Austria	29	26	10	7	6	21	7	6	12	13	4	4	21	13
7	Bahamas	33	142	-	-	100	-	--	93	29	-	112	-	-	2
8	Bahrain	39	88	53	-	23	78	82	56	77	-	59	-	45	3
9	Bangladesh	155	113	113	91	84	116	109	162	146	47	100	-	105	1
10	Barbados	28	133	-	-	110	-	87	77	30	-	-	-	77	2
11	Belarus	118	-	76	-	63	72	18	49	66	-	103	-	-	2
12	Belgium	15	19	24	15	78	23	11	15	17	14	3	14	22	12
13	Bhutan	129	78	-	-	140	-	80	107	25	-	149	-	-	1
14	Bosnia&Herzegovina	84	79	93	79	72	76	50	78	101	-	72	-	92	1
15	Botswana	133	139	119	-	122	80	121	103	34	-	-	-	91	1
16	Brazil	46	22	58	66	91	66	53	55	106	34	56	61	71	3
17	Brunei	20	128	-	-	-	71	88	46	35	-	80	-	56	3
18	Bulgaria	91	61	65	72	48	40	39	41	74	-	52	52	49	5
19	Cabo Verde	110	146	79	-	162	-	92	144	41	-	-	-	112	1
20	Canada	7	5	25	24	12	17	21	20	12	6	20	13	14	13
21	Chile	67	27	70	44	41	51	28	44	26	28	34	46	33	10
22	China	88	51	21	47	7	14	48	120	80	45	26	42	28	9
23	Colombia	62	65	44	37	150	67	67	50	96	48	58	54	57	4
24	Costa Rica	82	62	36	52	125	55	35	52	44	-	73	-	62	3
25	Côte d'Ivoire	167	105	-	-	182	103	128	176	106	-	50	-	118	1
26	Croatia	51	38	57	51	36	44	19	34	63	-	49	53	63	6
27	Cuba	68	110	27	-	114	-	55	64	60	-	146	-	-	1
28	Cyprus	17	77	29	81	40	28	34	31	41	-	45	21	44	10
29	Czech	42	42	28	12	43	26	8	21	44	20	22	39	32	13
30	Denmark	14	8	8	4	15	7	2	1	1	7	8	2	10	13

Chart 3: Partial view of 108 countries position belonging in at least one of the 13 rankings Source: Author (2020)

Chart 3 shows a partial list of the countries organized by their rank and alphabetical order, the rest of the countries can be viewed in Appendix A.

This Chart shows that the NP13R of Albania is lower than seven, only was able to be once

(NP13R) on the 50 Top positions among 13 rankings. The best position was 39th in the Ranking 2 (Global Health Security Index 2019), reason by which receive a red color and was not able to go to the Semi-Final list.

On the other hand, Australia NP13R is higher than seven, it is present as top 50 in all rankings (NP13R=13), with the 4th position being the best in Ranking 2, reason by which received a black color and was able to be considered as Semifinalist for further calculations. The same logic was adopted for other countries, and the character "-" means that the country was not evaluated by the ranking.

After the calculations (using the average of all scores), it was possible to identify the best well evaluated countries. From 108 nations, only 44 (40,7%) countries can go for the next phase (Table1).

Table 1: The 44 Semifinalist, best well evaluated countries organized by average (X) descending order

R.	NP13R	COUNTRY	CONT.	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	X	S	CV %	MED
1	13	SWITZERLAND	Europe	79	67	84,16	72,44	75,2	67,24	79,4	81,5	85	83,9	90,63	100	82,3	**80,6**	9,1	11,3	81,5
2	13	DENMARK	Europe	77	70,4	82,76	80	67,1	58,44	84,6	82,5	87	79,3	93,45	90,8	81,2	**79,6**	9,6	12,1	81,2
3	12	SWEDEN	Europe	83	72,1	81,96	69,23	52,2	63,65	84,7	78,7	85	83,9	95,36	86,94	81,2	**78,3**	11,3	14,5	82,0
4	13	NETHERLANDS	Europe	80	75,6	82,62	74,65	65,1	61,44	80,4	75,3	82	79,2	94,31	81,81	82,4	**78,1**	8,2	10,5	80,0
5	13	FINLAND	Europe	79	68,7	79,96	75,79	58,4	59,83	83,8	78,9	86	82	92,74	83,14	80,2	**77,6**	9,9	12,7	80,0
6	13	GERMANY	Europe	75	66	82,35	73,32	74,9	58,19	80,8	77,2	80	69,5	100	80,78	81,8	**76,9**	9,9	12,8	77,2
7	13	NORWAY	Europe	84	64,6	83,37	74,36	68,5	51,87	80,3	77,7	84	82,6	84,23	85,95	78,1	**76,9**	9,9	12,9	80,3
8	13	AUSTRIA	Europe	72	58,5	82,51	78,73	72,6	50,94	80,7	79,6	77	75,4	94,52	86,91	76,6	**75,8**	11,2	14,8	77,0
9	8	HK	Asia	-	-	83,1	66,08	69,8	55,54	-	-	76	-	91,21	78,14	83,1	**75,4**	11,3	15,0	77,1
10	13	CANADA	North Am	79	75,3	80,2	71,58	69,9	53,88	78,2	71	77	79,7	85,17	78,63	79,6	**75,3**	7,7	10,3	78,2
11	13	JAPAN	Asia	79	59,8	86,25	81,14	73,8	54,68	79,2	75,1	73	76,3	94,51	61,69	82,3	**75,1**	11,0	14,7	76,3
12	13	AUSTRALIA	Oceania	72	75,5	81,78	77,38	71,6	50,34	74,9	74,9	77	79,2	85,94	76,41	78,7	**75,1**	8,4	11,1	76,4
13	12	UK	Europe	80	77,9	80,54	74,46	51,3	61,3	79,8	81,3	77	69,5	93,3	69,09	81,2	**75,1**	10,5	14,0	77,9
14	13	NEW ZELAND	Oceania	76	54	80,83	73,81	71,5	49,55	79,2	71,3	87	81,8	89,82	75,57	76,7	**74,4**	11,5	15,4	76,0
15	12	SINGAPORE	Asia	85	58,7	86,63	70,84	74,4	58,37	67	58,1	85	71,6	93,59	81,8	84,8	**75,1**	12,1	16,1	74,4
16	12	BELGIUM	Europe	77	61	80,53	74,34	49,8	50,18	80	73,3	75	74,5	94,93	78,42	76,4	**72,7**	12,4	17,1	75,0
17	11	USA	North Am	74	83,5	74,94	69,27	53	61,73	76,4	69,3	69	56,2	90,12	79,24	83,7	**72,3**	10,9	15,0	74,0
18	12	FRANCE	Europe	70	68,2	81,89	79,99	52,9	54,25	81,1	80	69	66,5	88,85	68,53	78,8	**72,3**	10,8	14,9	70,0
19	10	TAIWAN	Asia	70	-	79,37	86,71	66,7	-	-	57,2	65	64,3	81,2	71,56	80,2	**72,2**	9,3	12,9	70,8
20	10	LUXEMBOURG	Europe	69	43,8	81,44	-	57,6	53,47	74,3	82,3	80	-	82,15	86,65	77	**71,6**	14,0	19,6	77,0
21	13	SK	Asia	72	70,2	84,16	81,97	71,2	56,55	78,3	66,5	59	59,2	81,59	62,54	79,6	**71,0**	9,7	13,6	71,2
22	13	SPAIN	Europe	74	65,9	82,07	78,88	54,3	47,85	78,1	74,3	62	75,6	88,44	63,59	75,3	**70,8**	11,5	16,2	74,3
23	11	ICELAND	Europe	79	46,3	82,82	65,92	60	51,53	77,5	72,3	78	-	69,5	85,15	74,7	**70,2**	12,2	17,4	73,5
24	12	IRELAND	Europe	76	59	80,86	51,89	55,1	56,1	79,4	72,8	74	77,5	78,42	73,29	75,1	**70,0**	10,4	14,8	74,0
25	12	ISRAEL	Asia	82	47,3	82,37	73,29	74,8	57,43	74,6	65,8	60	50,1	72,09	73,26	76,7	**68,4**	11,4	16,7	73,3
26	13	PORTUGAL	Europe	71	60,3	79,4	71,88	54,2	44,65	77,6	67	62	73,1	82,56	69,8	70,4	**68,0**	10,5	15,5	70,4
27	11	ESTONIA	Europe	68	57	75,27	72,67	55,6	49,97	80,1	65,3	74	-	72,21	66,88	70,9	**67,3**	9,0	13,3	69,5
28	12	SLOVENIA	Europe	78	67,2	79,22	64,58	56,4	42,25	79,8	72	60	-	72,3	64,16	70,2	**67,2**	10,8	16,1	68,7
29	11	ITALY	Europe	70	56,2	81,83	66,59	53,3	46,3	77	71	53	74,3	85,56	61,59	71,5	**66,8**	12,0	17,9	70,0
30	13	CZECH	Europe	69	52	79,77	74,62	54,5	49,43	80,6	71	56	67,1	83,72	56,92	70,9	**66,6**	11,7	17,5	69,0
31	10	UAE	Asia	61	46,7	76,14	67,04	70	42,17	70,3	55,6	71	58,1	92,35	65,69	75	**65,5**	13,1	20,1	67,0
32	12	POLAND	Europe	69	55,4	77,49	61,01	57	41,31	78,1	60,9	58	62	79,32	58,83	68,9	**63,6**	10,7	16,9	61,0
33	9	MALAYSIA	Asia	66	62,2	77,62	68,1	56,5	42,68	71,8	47,9	53	61,7	69,37	70,82	74,6	**63,3**	10,6	16,8	66,0
34	9	MALTA	Europe	79	37,3	82,05	68,81	54,4	49,01	76	70,7	54	-	56,66	-	68,5	**63,3**	14,0	22,1	68,5
35	10	CYPRUS	Asia	76	43	79,69	51,75	55	48,34	75,2	64,8	58	-	67,18	71,35	66,4	**63,1**	11,8	18,7	65,6
36	9	LITHUANIA	Europe	58	55	70,94	69,49	56,6	41,46	75	62,9	60	-	63,02	66,51	68,4	**62,3**	9,0	14,4	63,0
37	10	CHILE	South Am	65	58,3	73,1	65,44	54,9	36,64	77,4	55,3	67	60,3	72,38	49,97	70,5	**62,0**	11,1	17,9	65,0
38	9	LATVIA	Europe	64	62,9	71,34	62,91	56,4	43,23	77,7	61,6	56	-	56,54	62,08	67	**61,8**	8,6	13,9	62,5
39	10	THAILAND	Asia	59	73,2	78,75	77,95	54,1	38,63	74,5	45,4	36	65,1	75,31	53,84	68,1	**61,5**	14,9	24,3	65,1
40	9	GREECE	Europe	64	53,8	79,06	56,21	56	38,9	74,3	69,1	48	66,3	68,86	54,77	62,6	**60,9**	11,1	18,1	62,6
41	9	HUNGARY	Europe	67	54	75,45	47,8	65,6	44,51	77,3	63,7	44	-	75,55	50,28	65,1	**60,9**	12,3	20,2	64,4
42	9	CHINA	Asia	62	48,2	80,86	64,48	71,7	54,82	73,9	37,3	41	48,3	81,37	54,02	73,9	**60,9**	14,8	24,4	62,0
43	8	QATAR	Asia	61	41,2	76,07	73,3	57,5	33,86	64,7	37,1	62	51	77,28	67,36	72,9	**59,6**	14,8	24,8	62,0
44	7	VIETNAM	Asia	46	49,1	77,29	57,7	63,7	38,84	73,8	33,4	37	59,4	71,03	-	61,5	**55,7**	14,8	26,6	58,6

Source: Author (2020)

Table 1 shows the basic information of the 44 Semi-Finalist countries, organized by descending average (X) order:

a) most of the semifinalist are from Europe with 26 nations (59,1%), followed by 13 (29,5%) Asiacountries, 2 (4,5%) from North America, 2 (4,5%) from Oceania, and only one (2,3%) from South America continent;

b) the global average of all 44 countries score in all ranking is 69,6 points, with a median of 71.6points, a little bit higher than the global average.

c) the top ten semifinalist nations are: 1) Switzerland (X=80.6); 2) Denmark (79.6); 3) Sweden(78.3); 4) Netherlands (78.1); 5) Finland (77.6); 6) Germany (X=76.9; S=9,9; CV=12.8%); 7) Norway (X=76.9; S=9,9; CV=12.9%); 8) Austria (75.8); 9) Hong Kong (75.4); and 10) Canada (75.3). Most of these ten countries belong to all 13 rankings, showing that they have been on the top of 50 countries, except Sweden (NP13R=12) and Hong Kong (NP13=8).

d) on the other hand, the ten last semifinalists are: 44) Vietnam (55.7); 43) Qatar (59.6); 42) China(X=60.9; S=14.8); 41) Hungary (X=60.9; S=12.3); 40) Greece (X=60.9; S=11.1); 39) Thailand (61.5); 38) Latvia (61.8); 37) Chile (62); 36) Lithuania (62.3); and 35) Cyprus (63.1).

Most of these countries are among the 50 best nations in at least 9 rankings, except Vietnam with NP13R = 7.

3.15 Ranking 15: The Finalists, Benchmark countries

Finally, the last rank of the holistic methodology aims to identify the FATALITY TOTAL INDEX (FTI) of each country, since it is a way to measure how effective a country is in saving people`s lives against Covid-19.

Balsari, Buckee, and Khanna (2020) stressed the importance of data, and alerted that bad data could produce serious missteps, specially when models are produced and presented without appropriate expertise.

Several organizations around the world are trying to collect data to develop indicators that involve the amount of fatal (or death) cases, such as a) total number of fatal cases by a total number of cases; b) the total number of fatal cases by a total number of recovered cases; c) a total number of fatal cases by 100 confirmed cases; d) a total number of fatal cases by 100,000 population; e) a total number of death cases by age, etc. For instance:

1) The John Hopkins University & Medicine Coronavirus Resource Center <https://coronavirus.jhu.edu/data/mortality> creates the concept of Mortality, by using two indicators: the number of deaths cases per 100 confirmed cases (case-fatality ratio); the number of deaths per 100,000 population; 2) The worldometers <https://bit.ly/3dpMErI> publish the indicator Deaths per 1M Population; 3) Our world in data <https://ourworldindata.org/covid-deaths> publishes dynamic charts related to the death issue, and there is a section dedicated to total confirmed COVID-19 deaths per million people. The Our world in data recommend to adjust the number of the death by the size of the population, by giving the following argument: a) if 1,000 people died in Iceland, out of a population of about 340,000, that would have a far bigger impact than the same number dying in the USA, with its population of 331 million; b) the death count in more populous countries tends to be higher (Figure 10).

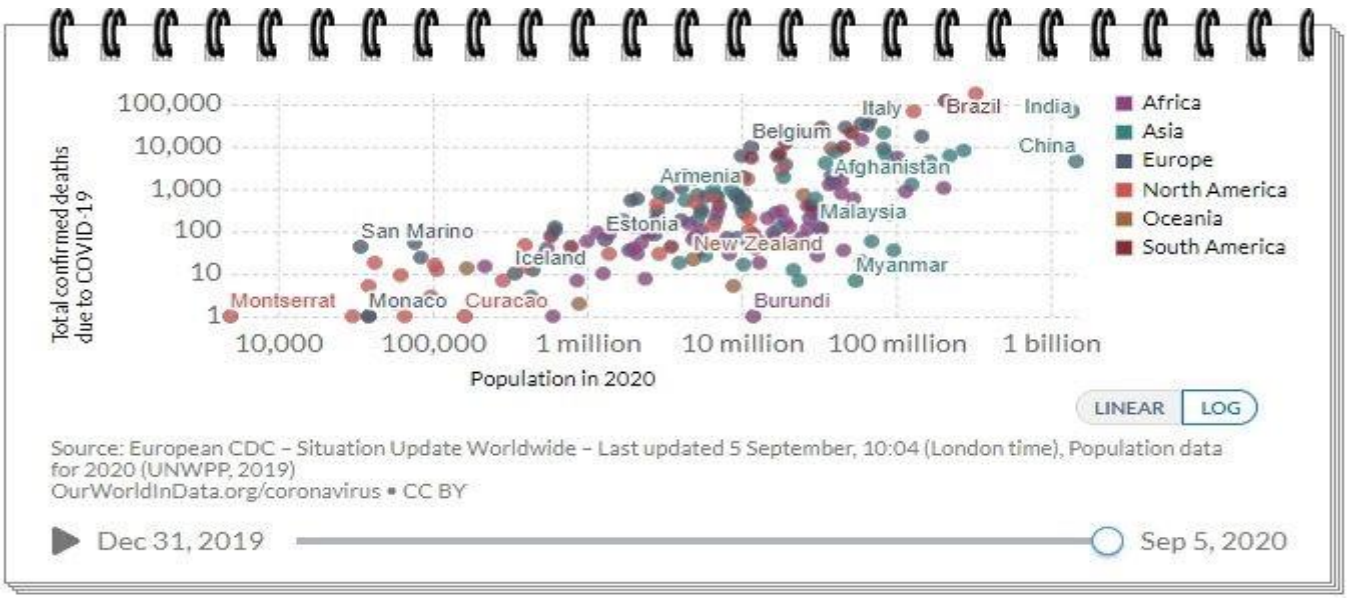


Figure 10: Total confirmed deaths due to Covid-19 versus population, September 5, 2020

The Our world in data also provides other indicators related to the death as can be viewed in this link <https://bit.ly/3jPYazc>.

4) The Centre for the Mathematical Modelling of Infectious Diseases (CMMID) at the London School of Hygiene & Tropical Medicine The London <https://bit.ly/30N6qtj> since January 09, 20 (Table 2) collect data and publishes regularly a report entitled "Using a delay-adjusted case fatality ratio to estimate under-reporting" to estimate the percentage of symptomatic COVID-19 cases reported in different countries using case fatality ratio estimates based on data from the European Centre For Disease Prevention and Control (ECDC), correcting for delays between confirmation-and-death. (GOLDING, N. et *al*. 2020)

Table 2: Partial view of the daily countries PSCR estimates available in CSV file

DATE	COUNTRY	MEDIAN	LOWER_95_CRI	UPPER_95_CRI
2020-01-09	China	0,062561207119329	0,026352077931166	0,335729749788873
2020-01-10	China	0,106136838582178	0,041074620129517	0,337474784326419
2020-01-11	China	0,222473255679798	0,06270917627675	0,522314682497327
2020-01-12	China	0,442589295406042	0,125010754019003	0,905093413977999
2020-01-13	China	0,699369172465278	0,238309090849068	0,998076707880888
2020-01-14	China	0,870614958703778	0,243811163419528	0,999999006827187
2020-01-15	China	0,936617428421074	0,280530981923762	0,999999999998957
2020-01-16	China	0,952256130591838	0,280536366860139	1
2020-01-17	China	0,955504848706729	0,280541611111054	1
2020-01-18	China	0,956426386151832	0,280546708811926	1
2020-01-19	China	0,956391221510922	0,280551654088151	1
2020-01-20	China	0,956174607851056	0,275274143631855	1
2020-01-21	China	0,955973095350612	0,262339738977067	1
2020-01-22	China	0,955798662428949	0,251652085154879	1
2020-01-23	China	0,955653811270551	0,243386713856836	1
2020-01-24	China	0,955540976285247	0,238345038527729	1
2020-01-25	China	0,955462738141124	0,23834916928814	1

Source: Golding, N. et. *al* (2020)

Although the Golding, N. et *al*. (2020) methodology has not been peer-reviewed, it describes the methods and limitations used to calculate the percentage of symptomatic cases reported (PSCR). The Confidence Intervals are calculated using an exact binomial test with 95% significance.

According to Golding, N. et *al*. (2020, p. 2-3) this methodology arguments that:

a) asymptomatic COVID-19 infections are often unreported, which means that confirmed case counts may not accurately reflect underlying epidemic dynamic;

b) in real-time, dividing deaths-to-date by cases-to-date leads to a biased estimate of the case fatality ratio (CFR), because this calculation does not account for delays from confirmation of a case to death, and under-reporting of cases;

c) using the distribution of the delay from hospitalization to death for fatal cases, it is possible toestimate how many cases so far are expected to have known outcomes (i.e. death or recovery), and hence adjust the naive estimates of CFR to account for these delays and produce a delay-adjusted CFR (CFR);

d) for each country it is possible to calculate the dCFR on each day and use the ratio of the baseline CFR to the dCFR estimate to produce daily estimates of the proportion of unreported cases;

e) the data are collected from countries that have reported more than ten deaths to date, then use these under-ascertainment estimates to reconstruct global epidemics in all countries where case and death time series data are available.

This study is important to understand the % of symptomatic cases reported, and the % of symptomatic cases have been missed by the surveillance system.

For example, the last report published August 25, 2020 concerning to the current under-report, estimated the median of PSCR of 155 countries listed in alphabetic order, and Figure 11 shows that the PSCR median of Australia (one of the semi-finalist) is 32%, meaning that the only 32% of the all symptomatic cases were reported during the period analyzed, and around 68% of symptomatic cases were missed by the Australia surveillance system.

Using this last result, the real estimated total deaths in Australia until August 25, 2020, could be around 1616 cases (517 / 0.32), with 1099 cases missed, not officially reported by the authorities.

Country	Percentage of symptomatic cases reported (95% CI)	Total cases	Total deaths
Afghanistan	31% (21%-45%)	38,070	1,397
Albania	49% (35%-67%)	8,605	254
Algeria	78% (61%-96%)	41,858	1,446
Andorra	65% (27%-100%)	1,060	53
Angola	29% (21%-43%)	2,222	100
Argentina	51% (45%-57%)	350,854	7,366
Armenia	74% (58%-90%)	42,825	854
Australia	32% (24%-41%)	24,916	517
Austria	97% (84%-100%)	25,547	733

Figure 11: Estimates for the proportion of symptomatic cases reported (PSCR) in part of 155 countries using cCFR estimates based on case and death time series data from the ECDC, August 25, 20

Source: https://bit.ly/30N6qtj

After giving the above information, the FATALITY TOTAL INDEX (FTI) for each 44 country was calculated by using the formula (2)

(2) FTI = [(TFC / MPSCRnd) / 1MP / ND)]

Where:

TFC = Total Fatal Cases

MPSCRnd = Median of PSCR related to the ND

1MP = one million of the population

ND = Nth day facing the Covid-19 since the first official case reported by the government

The TFC will be collected from the worldometer site <https://bit.ly/3dpMErI> since it is one of the most dynamic and updated sites about COVID-19;

The population of each country was collected at the beginning of July, from the United Nations Population Fund, U. (2019), which shows the population of each country and other indicators for 2020. Since each country will be evaluated for six months (ND=180), it will be used the median of PSCR related to the nth day identified for each country, taking into consideration the delay of 13 days, by using the under-reporting estimates available in .csv file on the CMMI site <https://bit.ly/30N6qtj> as shown in Table 2.

For those countries that there is no value of PSCR (example: Hong Kong, Malta, Taiwan, and Vietnam) due to the number of fatal cases be very low, it was considered the PSCR value of 50%, to be able to find the FTI.

To have a more comprehensive idea of the evolution of the Median of PSCR over time, for each country, it was collected the MPSCRnd for 60, 70, 80, 90, 100, 120, 150, and 180 days, taken the average and results from Table 3 and Table 4 show that in terms of the percentage of symptomatic cases reported:

The ten best countries are: 1) Qatar (XMPSCR=96.30%); 2) China (XMPSCR=95.95%); 3) Singapore (XMPSCR=91.61%); 4) Iceland (XMPSCR=91.34%); 5) Australia (XMPSCR=90.79%); 6) Cyprus (XMPSCR=88.92%); 7) Malaysia (XMPSCR=81.05%); 8) Thailandia (XMPSCR=77.04%); 9) Luxembourg (XMPSCR=74.06%); and 10) Chile (XMPSCR=71.31%);

On the other hand, the weakest countries are: 44) France (XMPSCR=14.35%); 43) Italy (XMPSCR=15.34%); 42) UK (XMPSCR=17.68; 41) Hungary (XMPSCR=20.07%); 40) USA (XMPSCR=24.26%); 39) Sweden (XMPSCR=24.47%); 38) Belgium (XMPSCR=26.39%); 37) Canada (XMPSCR=27.34%); 36) Spain (XMPSCR=28.09%); and 35) Japan (XMPSCR=28.61%).

Table 3: The 22 best finalist countries in terms of MPSCRnd from 60 to 180 days

RANK	COUNTRIES	CONTINENT	XMPSCR	MPSCR60	MPSCR70	MPSCR80	MPSCR90	MPSCR100	MPSCR120	MPSCR150	MPSCR180
1	QATAR	Asia	96,30%	98,19%	98,46%	98,49%	98,33%	97,95%	96,10%	91,73%	91,17%
2	CHINA	Asia	95,95%	96,54%	96,74%	96,60%	95,93%	94,12%	94,53%	96,42%	96,69%
3	SINGAPORE	Asia	91,61%	.	.	87,60%	88,83%	90,57%	93,17%	94,70%	94,80%
4	ICELAND	Europe	91,34%	91,50%	91,71%	91,75%	91,66%	91,52%	91,27%	91,07%	90,25%
5	AUSTRALIA	Oceania	90,79%	95,19%	95,21%	93,45%	89,97%	88,87%	94,67%	96,38%	72,55%
6	CYPRUS	Asia	88,92%	89,25%	89,15%	89,00%	88,86%	88,79%	88,92%	89,00%	88,41%
7	MALAYSIA	Asia	81,05%	29,40%	53,64%	78,79%	92,38%	97,26%	99,31%	99,31%	98,29%
8	THAILAND	Asia	77,04%	.	65,61%	66,44%	71,52%	76,90%	83,87%	87,20%	87,71%
9	LUXEMBOURG	Europe	74,06%	47,67%	51,54%	58,71%	68,75%	79,15%	92,45%	97,62%	96,57%
10	CHILE	South America	71,31%	73,88%	73,99%	75,47%	73,29%	61,08%	80,49%	72,27%	60,03%
11	NORWAY	Europe	70,41%	34,01%	46,95%	65,07%	76,77%	80,39%	80,36%	89,63%	90,12%
12	ESTONIA	Europe	67,81%	39,35%	47,66%	57,23%	66,72%	74,66%	84,31%	87,71%	84,81%
13	UAE	Asia	66,23%	.	67,54%	47,08%	28,55%	28,22%	92,90%	99,79%	99,56%
14	CZECH REP	Europe	65,48%	30,56%	32,91%	40,38%	56,08%	73,85%	93,23%	98,79%	98,07%
15	DENMARK	Europe	63,54%	27,98%	36,20%	45,68%	56,00%	66,42%	83,72%	95,23%	97,05%
16	NEW ZELAND	Oceania	62,03%	54,12%	56,52%	59,06%	61,29%	63,16%	66,01%	68,22%	67,89%
17	PORTUGAL	Europe	60,89%	36,35%	34,72%	29,74%	31,47%	58,75%	99,49%	99,85%	96,78%
18	ISRAEL	Asia	59,45%	46,42%	49,94%	44,56%	38,79%	49,01%	93,65%	99,66%	53,54%
19	SOUTH KOREA	Asia	56,22%	60,00%	40,83%	31,58%	31,54%	37,34%	57,58%	92,78%	98,08%
20	FINLAND	Europe	50,19%	50,22%	32,18%	19,64%	17,54%	25,86%	69,30%	94,05%	92,72%
21	HONG KONG	Asia	50,00%	50,00%	50,00%	50,00%	50,00%	50,00%	50,00%	50,00%	50,00%
22	MALTA	Europe	50,00%	50,00%	50,00%	50,00%	50,00%	50,00%	50,00%	50,00%	50,00%

Source: Author (2020)

Table 4: The 22 weakest finalist countries in terms of MPSCRnd from 60 to 180 days

RANK	COUNTRIES	CONTINENT	XMPSCR	MPSCR60	MPSCR70	MPSCR80	MPSCR90	MPSCR100	MPSCR120	MPSCR150	MPSCR180
44	FRANCE	Europe	14,35%	5,24%	3,62%	3,86%	5,28%	6,70%	8,73%	24,11%	57,27%
43	ITALY	Europe	15,34%	7,42%	9,87%	11,33%	12,06%	13,13%	13,53%	20,16%	35,22%
42	UK	Europe	17,68%	4,75%	4,48%	6,11%	9,21%	12,31%	15,43%	26,19%	62,99%
41	HUNGARY	Europe	20,07%	9,53%	10,89%	11,85%	12,29%	12,71%	17,43%	39,47%	46,40%
40	USA	North America	24,26%	16,08%	13,24%	11,92%	12,03%	15,19%	22,34%	35,66%	67,59%
39	SWEDEN	Europe	24,47%	8,86%	6,16%	6,74%	9,04%	11,14%	15,67%	60,74%	77,37%
38	BELGIUM	Europe	26,39%	5,14%	6,07%	9,02%	12,43%	14,64%	19,66%	47,83%	96,35%
37	CANADA	North America	27,34%	33,96%	23,02%	14,84%	12,14%	13,68%	15,89%	28,63%	76,55%
36	SPAIN	Europe	28,09%	3,97%	5,59%	8,20%	7,43%	5,62%	26,00%	76,60%	91,34%
35	JAPAN	Asia	28,61%	13,08%	22,68%	28,60%	26,49%	19,34%	10,08%	17,39%	91,21%
34	NETHERLANDS	Europe	31,62%	4,85%	5,62%	7,97%	9,96%	11,18%	16,54%	98,20%	98,64%
33	GERMANY	Europe	34,57%	37,13%	23,71%	17,55%	16,09%	17,21%	22,20%	46,60%	96,03%
32	IRELAND	Europe	37,06%	18,81%	25,05%	31,63%	34,48%	31,92%	22,94%	48,65%	83,02%
31	SLOVENIA	Europe	39,36%	16,56%	19,37%	24,25%	31,26%	39,81%	56,12%	65,41%	62,11%
30	GREECE	Europe	44,30%	26,01%	25,06%	23,78%	24,63%	29,56%	54,37%	83,90%	87,06%
29	LITHUANIA	Europe	44,40%	34,65%	32,14%	29,80%	29,47%	32,52%	48,52%	72,16%	75,97%
28	POLAND	Europe	45,19%	23,35%	30,55%	38,00%	42,00%	41,78%	43,11%	64,40%	78,34%
27	LATVIA	Europe	48,26%	45,49%	45,48%	45,50%	45,62%	46,12%	48,98%	53,91%	55,01%
26	SWITZERLAND	Europe	48,54%	20,09%	20,35%	22,28%	26,95%	35,88%	67,66%	96,43%	98,68%
25	AUSTRIA	Europe	49,17%	22,27%	26,42%	33,32%	36,90%	35,11%	44,50%	97,74%	97,10%
24	HONG KONG	Asia	50,00%	50,00%	50,00%	50,00%	50,00%	50,00%	50,00%	50,00%	50,00%

Source: Author (2020)

With the data from Tables 3 and 4, it was possible to calculate the FTI of each country.

To facilitate the visualization, two tables were built. Table 5 shows the basic information of the twenty best benchmarks, considered the finalist listed in FTI180 ascending order, while Table 6 shows the performance of the other 24 semi-finalist countries.

Table 5: The 20 best benchmark countries that saved people lives against the covid-19 during 180 days

RANK	COUNTRIES	CONTINENT	SARS2003_TFC/TC	START	P2020 (Mil)	PD20	AGE>65(20)	DTFC180	TFC180	FTI180
1	VIETNAM	Asia	5 / 63	23/01/20	97,30	308,13	7,90	20/07/20	0	0,0000
2	TAIWAN	Asia	180 / 665	21/01/20	23,81	673,00	3,27	18/07/20	7	0,0033
3	THAILAND	Asia	2 / 9	13/01/20	69,80	135,13	13,00	10/07/20	58	0,0053
4	CHINA	Asia	349 / 5327	31/12/19	1439,32	147,67	12,00	27/06/20	4634	0,0185
5	MALAYSIA	Asia	2 / 5	25/01/20	32,40	96,25	7,20	22/07/20	123	0,0215
6	SINGAPORE	Asia	33 / 238	23/01/20	5,90	7915,73	13,40	20/07/20	27	0,0268
7	SOUTH KOREA	Asia	0 / 3	20/01/20	51,30	527,97	15,80	17/07/20	293	0,0324
8	NEW ZELAND	Oceania	0 / 1	28/02/20	4,80	18,21	16,40	25/08/20	22	0,0375
9	AUSTRALIA	Oceania	0 / 6	25/01/20	25,50	3,20	16,20	22/07/20	128	0,0384
10	JAPAN	Asia	NO CASE	16/01/20	126,51	347,78	28,40	13/07/20	982	0,0473
11	HONG KONG	Asia	300 / 1755	23/02/20	7,50	7039,71	18,20	20/08/20	73	0,1081
12	CYPRUS	Asia	NO CASE	09/03/20	1,21	127,66	14,40	04/09/20	21	0,1091
13	GREECE	Europe	NO CASE	26/02/20	10,43	83,48	22,30	23/08/20	242	0,1481
14	LATVIA	Europe	NO CASE	02/03/20	1,90	31,21	20,70	28/08/20	34	0,1807
15	ICELAND	Europe	NO CASE	28/02/20	0,34	3,40	15,60	25/08/20	10	0,1811
16	UAE	Asia	NO CASE	27/01/20	9,90	112,44	1,30	24/07/20	343	0,1933
17	CZECH REP	Europe	NO CASE	01/03/20	10,71	137,18	20,10	27/08/20	418	0,2211
18	LITHUANIA	Europe	NO CASE	28/02/20	2,73	45,13	20,60	25/08/20	85	0,2277
19	NORWAY	Europe	NO CASE	26/02/20	5,40	14,46	17,50	23/08/20	264	0,3014
20	ESTONIA	Europe	NO CASE	27/02/20	1,33	31,03	20,40	24/08/20	64	0,3152

Source: Author (2020)

Table 6: The others semifinalist countries performance in saving people lives against the covid-19 during 180 days

RANK	COUNTRIES	CONTINENT	SARS2003_TFC/TC	START	P2020 (Mil)	PD20	AGE>65(20)	DTFC180	TFC180	FTI180
21	MALTA	Europe	NO CASE	07/03/20	0,44	1454,04	21,30	02/09/20	13	0,3275
22	FINLAND	Europe	0 / 1	29/01/20	5,54	18,14	22,60	26/07/20	329	0,3558
23	POLAND	Europe	NO CASE	04/03/20	37,85	124,03	18,70	30/08/20	2033	0,3809
24	QATAR	Asia	NO CASE	27/02/20	2,90	227,32	1,70	24/08/20	194	0,4076
25	AUSTRIA	Europe	NO CASE	25/02/20	9,00	106,75	19,20	22/08/20	732	0,4653
26	SLOVENIA	Europe	NO CASE	04/03/20	2,10	102,62	20,70	30/08/20	133	0,5665
27	DENMARK	Europe	NO CASE	27/02/20	5,80	136,52	20,20	24/08/20	623	0,6149
28	GERMANY	Europe	0 / 9	27/01/20	83,80	237,01	21,70	24/07/20	9201	0,6352
29	HUNGARY	Europe	NO CASE	04/03/20	9,70	108,04	20,20	30/08/20	614	0,7579
30	ISRAEL	Asia	NO CASE	21/02/20	8,70	402,61	12,40	18/08/20	708	0,8444
31	PORTUGAL	Europe	NO CASE	02/03/20	10,20	112,37	22,80	28/08/20	1815	1,0215
32	LUXEMBOURG	Europe	NO CASE	29/02/20	0,62	231,45	14,40	26/08/20	124	1,1432
33	SWITZERLAND	Europe	0 / 1	25/02/20	8,70	214,24	19,10	22/08/20	2000	1,2942
34	CANADA	North America	41 / 251	27/01/20	37,71	4,04	18,10	24/07/20	8881	1,7092
35	NETHERLANDS	Europe	NO CASE	27/02/20	17,13	508,54	20,00	24/08/20	6202	2,0391
36	IRELAND	Europe	0 / 1	29/02/20	4,93	69,87	14,60	26/08/20	1777	2,4120
37	USA	North America	0 / 33	21/01/20	331,00	35,61	16,60	18/07/20	143376	3,5604
38	SPAIN	Europe	0 / 33	31/01/20	46,80	93,10	20,00	28/07/20	28436	3,6956
39	SWEDEN	Europe	0 / 3	31/01/20	10,10	24,72	20,30	28/07/20	5759	4,0943
40	FRANCE	Europe	1 / 7	24/01/20	65,30	122,58	20,80	21/07/20	30165	4,4812
41	BELGIUM	Europe	NO CASE	04/02/20	11,60	315,56	19,30	01/08/20	9841	4,8917
42	UK	Europe	0 / 4	31/01/20	67,90	272,90	18,70	28/07/20	41135	5,3432
43	CHILE	South America	NO CASE	03/03/20	19,10	24,28	12,20	29/08/20	11181	5,4176
44	ITALY	Europe	0 / 4	31/01/20	60,50	205,86	23,30	28/07/20	35277	9,1976

Source: Author (2020)

Both tables contain Rank, Countries, Continent, SARS2003_TFC (Total Fatal Case of SARS in 2003)/TC (Total Case), START (Data of the first COVID-19 case reported), P2020(Population per Million), PD20 (Population Density 2020), AGE>65 (Percentage of people over 65 years old in 20), HBED/1K (Number of Hospital Beds per 1000 people), DTFC180 (Date of Total Fatal Case complete 180 days), FTI180 (Fatal Total Case in the 180th day taking into consideration the delay of 13 days).

The basic profile (Table 5) of the twenty finalists is:

First) most (11=55%) are from Asia, while seven (35%) are from Europe, two from Oceania (10%), and no one from North America or South America;

Second) the six best benchmark countries are those from Asia (1. Vietnam (FTI180=0,0000); 2. Taiwan (FTI180=0,0033); 3. Thailand (FTI180=0,0053); 4. China (FTI180=0,0185); 5. Malaysia (FTI180=0,0215); 6. Singapore (FTI180=0,0268)), which suffered with fatal cases from first SARS-CoV in 2002/2003, followed by 7. South Korea (FTI180=0,0324); 8. New Zealand (FTI180=0,0375); 9. Australia (FTI180=0,0384); 10) Japan (FTI180=0,0473); 11. Hong Kong (FTI180=0,1081; 12. Cyprus (FTI180=0,1091); 13. Greece (FTI180=0,1481); 14. Latvia (FTI180=0,1807); 15. Iceland (FTI180=0,1811); 16. United Arab Emirates (FTI180=0,1933); 17. Czech (FTI180=0,2211); 18).Lithuania (FTI180=0,2277); 19. Norway (FTI180=0,3014); and 20. Estonia (FTI180=0,3152); Third) most (14=70%) of twenty countries are governed by man (Chart 4), while only six (30%) are governed by a woman (2. Taiwan; 8. New Zealand; 11. Hong Kong; 13. Greece; 19 Norway; and 20. Estonia). When is checked the gender of the Minister of Health of all twenty countries, it was noted that 80% are men and only 20% are women. This result indicates that is false the assumption that the best countries facing COVID-19 are managed in majority by woman leaders.

RANK	COUNTRIES	CONTINENT	HEAD	GENDER	LAST DEGREE	MINISTRY OF HEALTH	GENDER	LAST DEGREE
1	VIETNAM	Asia	Nguyen Xuan Phuc	M	Graduated	Nguyễn Thanh Long	M	PhD
2	TAIWAN	Asia	Tsai Ing-wen	F	PhD	Chen Shih-chung	M	Graduated
3	THAILAND	Asia	Prayut Chan-o-cha	M	Graduated	Anutin Charnvirakul	M	Graduated
4	CHINA	Asia	Xi Jinping	M	Graduated	Chen Zhu	M	PhD
5	MALAYSIA	Asia	AB Tan Sri Dato' Haji Muhyid	M	?	Adham Baba	M	Graduated
6	SINGAPORE	Asia	Lee Hsien Loong	M	Master	Lee Hsien Loong	M	Master
7	SOUTH KOREA	Asia	Moon Jae-in	M	Graduated	Park Neung-hoo	M	PhD
8	NEW ZELAND	Oceania	Jacinda Ardern	F	Graduated	Chris Hipkins	M	Specialist
9	AUSTRALIA	Oceania	Hon Scott Morrison	M	Graduated	Brendan Murphy	M	Graduated
10	JAPAN	Asia	Shinzo Abe	M	Graduated	Katsunobu Katō	M	Graduated
11	HONG KONG	Asia	Carrie Lam	F	Graduated	CHAN Hon-yee	F	Master
12	CYPRUS	Asia	Katsunobu Katō	M	Graduated	Constantinos Ioannou	M	Master
13	GREECE	Europe	Katerina Sakellaropoulou	F	Specialist	Kyriakos Mitsotakis	M	Master
14	LATVIA	Europe	Egils Levits	M	Graduated	Ilze Vinkele	F	Master 2x
15	ICELAND	Europe	Guðni Th. Jóhannesson	M	PhD	Svandís Svavarsdóttir	F	?
16	UAE	Asia	Khalifa bin Zayed Al Nahyan	M	Graduated	Abdul Rahman Mohammed	M	Graduated
17	CZECH REP	Europe	Miloš Zeman	M	Graduated	Adam Vojtěch	M	Graduated
18	LITHUANIA	Europe	Gitanas Nausėda	M	PhD	Aurelijus Veryga	M	PhD
19	NORWAY	Europe	Erna Solberg	F	Graduated	Bent Hoie	M	Graduated
20	ESTONIA	Europe	Kersti Kaljulaid	F	Specialist	Riina Sikkut	F	Master

Chart 4: Basic profile of the 20 benchmark countries concerning Head and Ministry of Health background Source: Author (2020)

Fourth) when was analyzed the evolution of Fatality Total Case of each 20 finalist country over the time (60, 70, 80, 90, 100, 120, 150, and 180 days) to identify the three most outstanding nations, it was learned that: a) Vietnam was the number one, with no death reported since the beginning; b) Taiwan and Thailand were the second and third outstanding countries because they changed these positions over the time. Other considerations can be done when analyzing the evolution of other countries by Chart 5.

When was analyzed the performance of the of all 44 semifinalist by population density, it was observed (Table 7) that: a) Singapore (7915.73 hab/km2), Hong Kong (7039.71 hab/Km2), Malta = (1454 hab/Km2), Taiwan (673 hab/Km2), South Korea (527.97 hab/Km2), Netherlands (508.54

hab/Km2), Israel (402,61 hab/Km2), Japan (347,78 hab/Km2), Belgium (315, 56 hab/Km2), and Vietnam (308.13 hab/Km2) are the ten nations with the highest level of population density; b) among the these countries, Taiwan showed the best performance, since it is the fourth country with the highest population density, but the second country (Table 5) with the lowest Fatal Total Index (0,0033), which demonstrate a high ability of this nation government to protect millions of people living very closely; c) also Singapore (FTI=0.268; 6th place), South Korea (FTI=0.0324; 7th place); Japan (FTI=0.0473; 10th place; and Vietnam (FTI=0,000; 1st place) are the best performers (among the 10 top finalist with the lowest FTI).

RANK	FTI60	FTI70	FTI80	FTI90	FTI100	FTI120	FTI150	FTI180
1	VIETNAM	VIETNAM	VIETNAM	VIETNAM	VIETNAM	VIETNAM	VIETNAM	VIETNAM
2	TAIWAN	THAILAND	THAILAND	TAIWAN	TAIWAN	TAIWAN	TAIWAN	TAIWAN
3	AUSTRALIA	TAIWAN	TAIWAN	THAILAND	THAILAND	THAILAND	THAILAND	THAILAND
4	NEW ZELAND	HONG KONG	HONG KONG	HONG KONG	HONG KONG	HONG KONG	CHINA	CHINA
5	HONG KONG	AUSTRALIA	SINGAPORE	SINGAPORE	CHINA	CHINA	HONG KONG	MALAYSIA
6	JAPAN	UAE	JAPAN	CHINA	SINGAPORE	MALAYSIA	MALAYSIA	SINGAPORE
7	MALAYSIA	JAPAN	CHINA	MALAYSIA	MALAYSIA	SINGAPORE	AUSTRALIA	SOUTH KOREA
8	CHINA	CHINA	AUSTRALIA	AUSTRALIA	AUSTRALIA	AUSTRALIA	SINGAPORE	NEW ZELAND
9	SOUTH KOREA	MALAYSIA	MALAYSIA	JAPAN	NEW ZELAND	NEW ZELAND	SOUTH KOREA	AUSTRALIA
10	CANADA	QATAR	QATAR	NEW ZELAND	SOUTH KOREA	SOUTH KOREA	NEW ZELAND	JAPAN
11	FINLAND	SOUTH KOREA	UAE	QATAR	JAPAN	CYPRUS	CYPRUS	HONG KONG
12	QATAR	NEW ZELAND	NEW ZELAND	SOUTH KOREA	CYPRUS	UAE	GREECE	CYPRUS
13	USA	CYPRUS	SOUTH KOREA	CYPRUS	QATAR	ICELAND	LATVIA	GREECE
14	GERMANY	FINLAND	CYPRUS	UAE	LATVIA	LATVIA	UAE	LATVIA
15	CYPRUS	LATVIA	LATVIA	LATVIA	ICELAND	GREECE	ICELAND	ICELAND
16	LATVIA	CHILE	MALTA	ICELAND	MALTA	CZECH REP	CZECH REP	UAE
17	CHILE	MALTA	ICELAND	MALTA	CZECH REP	ISRAEL	LITHUANIA	CZECH REP
18	MALTA	ICELAND	CHILE	CZECH REP	UAE	QATAR	MALTA	LITHUANIA
19	ICELAND	CANADA	GREECE	NORWAY	NORWAY	MALTA	JAPAN	NORWAY
20	LITHUANIA	ISRAEL	ISRAEL	GREECE	GREECE	JAPAN	ISRAEL	ESTONIA

Chart 5: Evolution of the 20 benchmark countries position (FTI) over the time Source: Author (2020)

Table 7: The ten countries with the highest density population (PD20) among all 44 semifinalist

RANK	COUNTRIES	CONTINENT	P2020 (Mil)	PD20	AGE>65(20)	DTFC180	TFC180	FTI180
1	SINGAPORE	Asia	5,90	7915,73	13,40	20/07/20	27	0,0268
2	HONG KONG	Asia	7,50	7039,71	18,20	20/08/20	73	0,1081
3	MALTA	Europe	0,44	1454,04	21,30	02/09/20	13	0,3275
4	TAIWAN	Asia	23,81	673,00	3,27	18/07/20	7	0,0033
5	SOUTH KOREA	Asia	51,30	527,97	15,80	17/07/20	293	0,0324
6	NETHERLANDS	Europe	17,13	508,54	20,00	24/08/20	6202	2,0391
7	ISRAEL	Asia	8,70	402,61	12,40	18/08/20	708	0,8444
8	JAPAN	Asia	126,51	347,78	28,40	13/07/20	982	0,0473
9	BELGIUM	Europe	11,60	315,56	19,30	01/08/20	9841	4,8917
10	VIETNAM	Asia	97,30	308,13	7,90	20/07/20	0	0,0000

Source: Author (2020)

When was analyzed the performance of the of all 44 semifinalist by the percentage of people over 65 years old (Table 8), it was observed that: a) most (90%) of ten countries with the highest percentage of people over 65 years old are from Europe; b) Japan (28.40%), Italy (23.3%), Portugal (22.8%), Finland (22.6), Greece (22.3%), Germany (21.7%), Malta (21.3%), France (20.8%), Latvia (20.7%), and Slovenia (20.7%) are leaders; c) among these ten countries, only Japan was able to be on the top ten best finalist

with the lowest FTI (0,0473), which indicate that Japan is the country with the highest level of ability to protect older people.

Table 8: The ten countries with the highest percentage of people over 65 (AGE>65) among all 44 semifinalists

RANK	COUNTRIES	CONTINENT	P2020 (Mil)	PD20	AGE>65(20)	DTFC180	TFC180	FTI180
1	JAPAN	Asia	126,51	347,78	28,40	13/07/20	982	0,0473
2	ITALY	Europe	60,50	205,86	23,30	28/07/20	35277	9,1976
3	PORTUGAL	Europe	10,20	112,37	22,80	28/08/20	1815	1,0215
4	FINLAND	Europe	5,54	18,14	22,60	26/07/20	329	0,3558
5	GREECE	Europe	10,43	83,48	22,30	23/08/20	242	0,1481
6	GERMANY	Europe	83,80	237,01	21,70	24/07/20	9201	0,6352
7	MALTA	Europe	0,44	1454,04	21,30	02/09/20	13	0,3275
8	FRANCE	Europe	65,30	122,58	20,80	21/07/20	30165	4,4812
9	SLOVENIA	Europe	2,10	102,62	20,70	30/08/20	133	0,5665
10	LATVIA	Europe	1,90	31,21	20,70	28/08/20	34	0,1807

Source: Author (2020)

4. Conclusions and recommendations

Based on the use of the proposed methodology it was possible to reach the following conclusions and recommendations:

a) the fifteen phases of the methodology, far from perfect, shows that among 108 well-evaluatedcountries, the top six benchmark nations are from Asia (1. Vietnam; 2. Taiwan; 3. Thailand; 4. China; 5. Malaysia; 6. Singapore), which suffered from fatal cases from the first SARS-CoV in 2002/2003, followed by 7. South Korea; 8. New Zealand; 9. Australia; 10. Japan; 11. Hong Kong; 12. Cyprus; 13. Greece; 14. Latvia; 15. Iceland; 16. United Arab Emirates; 17. Czech; 18. Lithuania; 19. Norway; and 20. Estonia. This research did not focus on the measures, projects, innovations, and cultural aspects that were adopted by each country over time, reason by which further research should be done to identify, and disseminate them;

b) most (11=55%) twenty benchmark countries are from Asia, while seven (35%) are fromEurope, two from Oceania (10%), and no one from North America or South America. This result indicates that Asian countries are more prepared because have learned the lessons from the past SARS 2003, much more than countries from North America and South America. Further research could be done to investigate the investment made over time by the best benchmark countries to improve the health care system, as well as other structures necessary to monitor, prevent, and face pandemics.

c) Among the 44 semifinalists, in terms of population density, it was learned that Taiwan showed the best performance, since it is the fourth country with the highest population density, but the second country with the lowest Fatality Total Index (0,0033), which may demonstrate a high ability of this nation government to protect millions of people living very closely. Also Singapore, South Korea, Japan, and Vietnam are the best performers, because they were among the 10 top finalist with the lowest FTI. So, further research should be done to investigate the main polity measures adopted by these countries to prevent and protect people living very closely;

d) among the 44 semifinalist, when was analyzed each country by the percentage of people over65 years old, it was observed that, only Japan with a high percentage of people over 65, was able to be on the top ten best finalist with the lowest Fatality Total Index, which indicate that Japan is the country with the highest level of ability to protect older people. Further research should be done to identify the best Japanese management practices in the Health Care System for older citizen;

e) although most benchmark countries are governed by man, it is necessary to stimulate and increase the participation of woman in political life, since leaders from Taiwan, New Zealand, Hong Kong, Greece, Norway; and Estonia are real cases that point out that competency and success is not a privilege of man in the power. In this sense, further research should be done to investigate the leadership by example developed by the leaders of each country during the crises, to disseminate the good practices adopted for future leaders;

f) due to the limitation of space, the study did no explain in detail the calculation and methodsadopted by the 13 international rankings. However, policymakers and government leaders could gain a holistic knowledge by studying most of the ranking described, to better serve their nation over time. Further research should be done in the 13 international rankings to identify, in each benchmark country, the improvements necessary to solve gaps found in health, innovation, sustainability, image, and competitiveness. For example, during the first 180 days, Vietnam was considered the best country to save people lives against COVID-19, however, it was in the 132nd place in Ranking 1 (Health-related SGD2017), in 141st place in Ranking 8 (Environment Performance Index 2020), in 95th place in Ranking 9 (Corruption Perception Index 2019), in 67th place in Ranking 13 (GCI 4.0 Index 2019), which provide huge space for improvements;

g) when was analyzed the evolution of Fatality Total Case of each 20 finalist over the time (60, 70,80, 90, 100, 120, 150, and 180 days) it was learned that: a) Vietnam was the best country with no death reported since the beginning; b) Taiwan and Thailand were the second and third countries because they changed these positions over the time; c) Iceland is a good performer, from the 19th place in the 60th day, it showed improvements, going to 15th place in the 180th day; d) on the other hand, Australia was not able to keep constant, dropping from the third place in 60th day to 9th place in 180th day. These result may show that the three top countries are more able to keep the pace over the time, while others face more difficulties to maintain the higher position, such as Qatar (12th position in FTI160, drop to 24th position in FTI280), USA (13th position in FTI60, drop to 37th position in FTI180), and Canada (10th position in FTI60, drop to 34th position in FTI180). Since this research focus on the analysis of 180 days, it will continue to collect and update the date for the next semesters.

5. Acknowledgments

My gratitude to:

a) family, parents and friends in Brazil that are encouraging the author during his research in United Kingdom;

b) Brazilian Amazon Federal University (UFAM) to authorize my post-doctorate abroad;

c) the team of The Manchester University, specially from MIOIR/Alliance Business School of

Manchester for their wonderful structure and staff;

d) Mr. Leo because he welcomed the author into his home in UK, his daily ideas are nice;

e) the teams of Copy Spyder, My bib, Edraw Max, Libre Office, PhotoScape, International Ranking, CMMID at the London School of Hygiene & Tropical Medicine The London, Typeform, which sites, packages, programs, reports and statistics are useful for this and next research;

f) he Editor and blind reviewers for their attention and contributions;

g) all technical, nurses, doctors, professors, researchers, infectologists, drivers, cookers, janitors, donors, public and private managers, volunteers that are bravely fighting the Covid-19, God Bless You.

6. Appendix A – Continuation of Chart 3

R	COUNTRY	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	NP13R
31	Dominican	114	91	85	76	106	87	73	74	48	-	87	-	78	1
32	Ecuador	76	45	63	26	74	99	46	57	93	-	62	-	90	3
33	Egypt	125	87	111	88	86	92	83	94	106	39	67	-	93	1
34	Estonia	44	29	55	20	35	24	10	30	18	-	36	27	31	11
35	Finland	10	10	26	10	24	6	3	7	3	4	10	8	11	13
36	France	37	11	16	5	60	16	4	5	23	21	16	25	15	12
37	Georgia	83	42	90	85	39	48	55	102	44	-	119	-	74	4
38	Germany	19	14	12	17	2	9	5	10	9	19	1	11	7	13
39	Greece	73	37	33	67	34	41	43	25	60	22	42	40	59	9
40	Greenland	123	-	-	-	49	-	--	-	-	-	-	-	-	1
41	Grenada	50	-	-	-	107	-	--	96	51	38	-	-	-	2
42	Guatemala	117	125	98	35	170	107	120	149	146	-	125	-	98	1
43	Hong Kong	-	-	6	42	13	13	--	-	16	-	12	15	3	8
44	Hungary	49	35	52	87	18	33	29	33	70	-	31	45	47	9
45	Iceland	12	58	7	43	22	20	26	17	11	-	40	7	26	11
46	India	150	57	109	38	56	52	117	168	80	36	44	59	68	3
47	Indonesia	135	30	97	55	97	85	101	116	85	33	46	40	50	5
48	Ireland	16	23	20	80	38	12	14	16	18	10	29	18	24	12
49	Israel	4	54	11	19	3	10	40	29	35	42	37	19	20	12
50	Italy	34	31	17	40	53	30	30	22	51	15	19	36	30	11
51	Jamaica	63	147	50	-	141	81	84	66	74	-	113	-	80	1
52	Japan	11	21	2	3	5	15	17	12	20	11	5	35	6	13
53	Jordan	24	80	80	45	89	91	89	48	60	-	84	51	70	3
54	Kazakhstan	87	83	84	86	71	79	65	85	113	-	71	38	55	1
55	Kuwait	32	59	51	68	21	75	112	47	85	-	63	-	46	4
56	Kyrgys Rep	104	47	89	-	108	90	52	105	126	-	108	-	96	1
57	Latvia	77	17	87	50	31	34	24	36	44	-	70	34	41	9
58	Lebanon	119	73	82	48	77	88	95	79	137	-	79	-	88	1
59	Liechtenstein	-	71	-	-	27	-	--	-	-	-	-	-	-	1
60	Lithuania	108	33	92	29	29	38	36	35	35	-	54	28	39	9
61	Luxembourg	41	67	19	-	25	18	44	2	9	-	24	5	18	10
62	Malaysia	57	18	39	34	30	35	60	68	51	27	41	22	27	9
63	Maldives	25	-	-	-	112	-	91	127	130	-	86	-	-	1
64	Malta	9	98	14	33	44	27	32	23	50	-	69	-	38	9
65	Mauritius	30	114	54	-	109	82	108	82	56	-	78	-	52	1
66	Mexico	75	28	37	27	50	56	69	51	130	40	51	60	48	6
67	Moldova	99	-	96	-	82	58	42	-	120	-	116	-	86	1
68	Mongolia	126	46	100	-	76	53	107	147	106	-	130	63	102	1

Chart 3: Partial view of 108 countries position belonging in at least one of the 13 rankings
Source: Author (2020)

6. Appendix A – Continuation of Chart 3

R	COUNTRY	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	NR13R
69	Montenegro	98	68	91	-	42	45	72	75	66	-	77	-	73	2
70	Netherlands	6	3	9	11	19	4	9	11	8	9	6	9	3	13
71	New Zeland	18	36	22	16	9	25	16	19	1	5	15	17	19	13
72	Nigeria	164	96	162	83	116	114	160	151	146	50	110	-	116	1
73	North Macedonia	74	90	56	65	103	52	62	43	106	-	81	-	82	1
74	Norway	2	16	5	14	14	19	6	9	7	3	21	6	17	13
75	Oman	78	73	61	60	33	57	76	110	56	-	43	-	53	2
76	Panama	35	68	45	57	90	75	81	70	101	-	38	-	66	3
77	Peru	85	49	60	69	96	48	61	90	101	25	83	56	65	3
78	Philippines	124	53	101	36	55	76	99	111	113	35	60	49	64	3
79	Poland	40	32	40	53	28	39	23	37	41	26	28	37	37	12
80	Portugal	31	20	30	23	46	32	25	27	30	16	23	23	34	13
81	Qatar	93	82	48	18	26	65	103	122	30	41	30	26	29	8
82	Romania	109	60	71	73	57	50	38	32	70	43	48	55	51	5
83	Russia	111	69	103	62	61	46	57	58	137	51	75	47	43	3
84	Saint Lucia	55	108	-	-	102	-	--	97	48	-	-	-	-	1
85	Saint Vincent and Gr	64	123	-	-	167	-	--	65	39	-	-	-	-	1
86	Saudi Arab	103	47	68	58	17	68	97	91	51	52	55	29	36	4
87	Serbia	89	41	72	84	54	62	33	45	91	-	65	-	72	3
88	Seychelles	47	133	38	-	135	-	--	38	27	-	-	-	76	4
89	Singapore	1	24	1	25	4	8	93	39	4	17	7	10	1	12
90	Slovak	23	52	43	56	59	37	27	26	59	-	53	57	42	6
91	Slovenia	13	12	32	46	32	31	12	18	35	-	35	31	35	12
92	South Africa	128	34	133	49	69	63	110	98	70	38	33	50	60	5
93	South Korea	26	9	4	2	10	11	20	28	39	31	25	33	13	13
94	Spain	22	15	13	6	45	29	22	14	30	12	17	32	23	13
95	Sri Lanka	72	120	49	21	85	89	94	109	93	-	94	-	84	2
96	Sweden	3	7	15	32	65	2	1	8	4	1	2	3	8	12
97	Switzerland	8	13	3	22	1	1	15	3	4	2	13	1	4	13
98	Taiwan	38	-	31	1	16	-	--	40	28	24	27	20	12	10
99	Thailand	105	6	35	8	47	43	41	80	101	23	32	43	40	10
100	Turkey	60	40	64	28	37	49	70	99	91	44	47	58	61	6
101	UK	5	2	23	13	68	5	13	4	12	18	9	24	9	12
102	Ukraine	130	94	114	78	66	47	47	60	126	-	66	44	85	3
103	Un Arab Em	94	56	47	39	11	36	71	42	21	32	11	30	25	10
104	Uruguay	45	81	34	41	51	62	45	61	21	-	85	-	54	5
105	USA	21	1	59	30	58	3	31	24	23	36	14	12	2	11
106	Uzbekistan	65	116	41	-	121	-	66	88	153	-	99	-	-	1
107	Venezuela	96	176	75	93	184	-	118	59	173	49	142	62	133	1
108	Vietnam	132	50	42	61	20	42	49	141	95	30	39	-	67	7

Chart 3: Partial view of 108 countries position belonging in at least one of the 13 rankings Source: Author (2020)

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How to reduce food waste in the B_M company`s restaurant

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Abstract

About a third of all food produced in the world is wasted. To reduce this unfortunate number, several companies are trying to do their part. The article analyzes the causes of food waste in the B_M company restaurant, located in the Industrial Pole of Manaus, to propose actions to improve its environmental performance. The research is of an applied nature, with data collection and analysis using qualitative and quantitative approaches. The procedures involve case study, documentary and bibliographic research, and survey application, based on a questionnaire composed of 2 sections and nine questions, applied randomly at lunchtime with 300 employees. After analyzing the data, it was concluded that waste is related to the preparation and menu of meals, occurring effectively in the consumption phase, when 58% of respondents leave food scraps on the plate, due to the bad taste of the meals (81 %), not pleasant menu (41%) and for over-serving (25%). The main foods left on the plate are beef (34%), chicken meat (32%), rice (23%), beans (20%), and fish (20%). In the end, six suggestions were given to managers to reduce food waste at the restaurant.

Key-words: Food waste; Restaurant; Meals.

1. Introduction

Food waste is a perceived problem worldwide. But when it comes to restaurants, it becomes clear, as it has a financial and environmental impact. According to Bradacz (2013), modernity has brought strength to the restaurant sector since, due to the hustle and bustle of everyday life, thousands of people stopped eating at home and started to frequent restaurants because of the practicality that these places offer. In this way, restaurants now have a share of the responsibility to combat food waste.

Mariz and Watanuki (2019) say that food waste brings with it a series of other social, economic, and environmental problems. Therefore, restaurants must prepare nutritionally balanced foods and be economically efficient and environmentally responsible.

The waste of food for restaurants has an impact on society. Tackling this problem has benefits for everyone, as it directly affects the financial part of restaurants and communities.

Amorim (2012) states that improving resource management within the production process is the goal

of all organizations. As a result, restaurants seek efficiency in their processes by reducing waste, as it represents better yields. Gratão et al (2016) state that food waste severely affects the financial side of restaurants, which is why they must seek measures to minimize these losses.

Given the above, this is a case study that took place at B_M (fictitious name), a company in the Manaus Industrial Pole that has sectors of Integrated Management System (SGI), Specialized Services in Safety Engineering and Occupational Medicine (SESMT), Production Planning and Control (PCP), Purchasing, Accounting, Information Technology (IT), Warehousing, Manual and Automatic Insertion. They produce remote controls, cards, power supplies, and digital routers, the latter line being the flagship of the organization since in 2018 it represented 80% of the company's annual revenue.

In 1998 and 2010, respectively, B_M was certified by ISO 9001 and ISO 14001, with the SGI being the sector responsible for actions related to these standards. Among them, there is the monitoring of the solid residues generated, as well as the correct final disposal of them.

The restaurant located in the company is outsourced, so all food preparation activities and waste disposal are the restaurant's responsibility. However, B_M should inspect and collect evidence that the procedures are being carried out correctly and works with the restaurant to improve the organization's environmental performance.

The restaurant sends the CDR (Waste Disposal Certificate) to the B_M monthly, in which information on the amount of waste generated in the previous month is described, allowing the analysis of the waste rate in the restaurant. For example, between 2016 and 2018, the restaurant saw a 10.5% increase in food waste (Table 1), with about 9,490 kg of organic waste.

Table 1: Generation of organic waste between 2016 and 2018 (Kg) in B_M

ITEM	2016	2017	2018	Increase of 2016 a 2018
Organic waste	2993,83	3150,57	3345,76	351,93 (10,5%)

Source: B_M's SGI sector

So, the main research question is "how to reduce food waste in the B_M restaurant?"

1.1 Objectives

The general objective is to analyze the causes of food waste in B_M's restaurant to propose actions to improve its environmental performance.

The specific objectives are: identify the causes of food waste; identify great management practices for reducing food waste, and propose improvement actions to reduce food waste.

1.2 Importance of research for the company

Food waste reflects on financial costs. Pistorello, Conto, and Zaro (2015) state that energy and water costs are additional disadvantages of food waste, whose financial resources could be used in other areas.

Villan and Alves (2010) claim that restaurants that have a waste rate of up to 5% of the produced are classified as excellent, those that have losses between 5% and 10% are considered in good condition, between 10% and 15% regular and above 15% lousy. Thus, food waste is a matter of survival for restaurants, as it is unsustainable to maintain an enterprise with high losses.

On the other hand, it is necessary to comply with the applicable laws. For example, Law 12,305 / 10 - National Solid Waste Policy (PNRS) - created in 2010 to reduce the amount of waste in landfills and

landfills, determines that everyone involved in the product's life cycle is responsible for the waste generated. Therefore, restaurants are required to correctly dispose of all waste generated in their activities following federal law, through the rules of the state supervisory body.

And Bill 675/2015 establishes the National Policy to Combat Food Waste and provides other measures. The purpose of this law is to increase the use of food suitable for human consumption by reducing waste and expanding the recycling of food unfit for human consumption.

For Mori et al (2015), the preference of shareholders, customers, employees, and other stakeholders in business operations is more focused on organizations with competitive advantage internally and externally.

In this sense, the research is relevant, as it contributes by offering suggestions for improvements to reduce waste, cost while complying with current laws.

1.3 Relevance of research to Society

Around 870 million people go hungry every day in the world, which searches for strategies that reduce food waste increasingly relevant and urgent (PEIXOTO; PINTO, 2016).

Bueno (2019) states that food waste is a problem faced by several nations due to the high growth of the world population. Bueno argues that one-third of all food production in the world becomes food waste and that Brazil loses and discards about 26 million tons of food suitable for human consumption per year.

According to FAO (2018), the number of undernourished people worldwide rising from 804 million in 2016 to 821 million people in 2017, of which almost 22 million live in South America. However, Martins and Farias (2002) affirm that making food available to everyone is not enough to increase world production, also necessary to involve everyone in the production chain in the fight against waste.

The research contributes to the fight against a problem that is not only political and economic also ethical and moral, as there is hunger in the world, even with excess food. These situations occur in Brazil, Amazonas, and Manaus.

1.4 Relevance of research to academia

The theme belongs to the Industrial Engineering Sustainability area. In the last ten years, there are no topics in articles related to food waste in an industrial restaurant, newspapers, and Industrial Engineering events (Table 2), as well as in five banks of theses chosen at random (Tables 3).

Table 2: Search for “Food waste” in Industrial Engineering annals and magazines (2008 to 2019)

Sources	Nº of articles	Authors
Annals of ENEGEP	1	Mariz an Watanuki (2019);
GEPROS Journal (ISSN19842430)	1	Abbade (2019);
Management & Production Journal (ISSN0104530X)	1	Moraes et al., (2019).
Total	3	-

Source: Author

Table 3: Search for "food waste" in 5 Dissertation and Thesis Database (2003 and 2019)

Sources	Nº of articles	Authors
Database of Dissertations and Theses at USP	3	Baba (2008); Cseh (2019); Pires (2013);
Database of Dissertations and Theses at UFRJ	2	Oliveira (2016); Travessa and Silva (2017);
Database of Dissertations and Theses at UFRS	1	Dal'Magro (2004);
Database of Dissertations and Theses at UFSC	1	Bradacz (2003);
Database of Dissertations and Theses at UFAM	1	Amorim (2012).
Total	8	-

Source: Author

Thus, this article can contribute to the local academics to reflect on the subject and to stimulate new research on a little-explored theme in a region containing an Industrial Pole with hundreds of companies that have restaurants that may be generating food waste.

2. Theoretical Reference

2.1 Definitions of food waste

According to Brazilian Law 675 of 2015, food waste is the reduction and disposal of food intended for human consumption. That is still suitable for that purpose.

According to FAO, food waste is the amount of food intended for human consumption that not attended its purpose (FAO, 2016; FAO, 2011; FAO, 1986 apud ABBADE, 2019).

For Peixoto and Pinto (2016), food waste is the combination of the terms loss (unintentional refuse) and disposal (intentional refuse) of food.

Melo et al (2018) define the term as the intentional disposal of items suitable for human consumption.

For the World Bank Group (2014), loss of food and food waste refers to edible parts of plants and animals intended for human consumption that is not ultimately consumed by people (THE WORLD BANK GROUP - TWBG, 2014 apud NASCIMENTO, 2018).

Based on these references, food waste is producing food suitable for human beings, but that is discarded as organic waste, still able to be consumed. In this research, food waste is specifically focused on the consumption phase, when the food is on the final consumer's plate.

2.2 Food waste around the world and in Brazil

According to the UN (2013), the world wastes around 1.3 billion tons of food per year. With part of these foods, it would be possible to satisfy the nutritional needs of more than 800 million people.

For Peixoto and Pinto (2016), this very high waste causes damage to society, evidenced by economic losses, as supply is reduced and, consequently, product prices are increased. Food waste in the world is estimated to reach approximately $ 750 billion every year.

According to Zanini (2013), world food production is more than enough to meet the needs of the entire world population, however, losses at different stages of the production chain, as well as in preparation and consumption, make this quantity produced not reach everyone. Identifying the causes of waste in the chain

phases is one of the most difficult tasks, as several factors must be taken into account, including the country, the climate, the transport system, awareness, production systems, arable land, etc.
In Brazil, it can be a reflection of what happens in the world. Villan and Alves (2010) states that Brazil loses about R $ 12 billion in food each year, enough to feed approximately 30 million people.

According to EMBRAPA (2016), Brazil is among the TEN countries that waste the most. Abbade (2019), on the other hand, argues that Brazil is considered a prominent food producer with global potential, but still needs to improve its production efficiency, improving the logistics process and levels of waste. With the Brazilian transport system, one should invest mainly in the railway network, as it is a more efficient transport system than the road, which would reduce the time of distribution of food and consequently the losses in the transport phase.

On the other hand, Busato and Ferigollo (2018) state that one of the main causes of waste is the population's lack of awareness. Therefore, there must be respect and consideration across the planet about food.

2.3 Food waste in restaurants

The control of waste is a factor of great relevance, as it is not only an ethical issue but also an economic one with political and social reflexes (ZANINI, 2013). Most restaurants are companies that seek financial gains, and food waste needs to be one of the most important issues for managers, as it affects costs, prices, and customer satisfaction. Thus, it is important to measure all forms of losses in an establishment to have real data that can help in eliminating the causes of financial losses.

According to Silvério and Oltramari (2014), the waste of food in a restaurant is evidence of a lack of quality and must be avoided through adequate planning, so that there is no excess production and leftovers.

Villan and Alves (2010), on the other hand, state that food waste in restaurants is caused by unhealthy habits and customs or flaws in production or administration.

A fundamental condition, for the good performance of Food Services, is the adequate planning of the volume of meals to be prepared, as it aims, among other aspects, to reduce or control food waste (SILVA JUNIOR; TEIXEIRA, 2008 apud PARISOTO; HAUTRIVE; CEMBRANEL, 2013).

2.4 Good practices for reducing food waste in restaurants.

Restaurant managers need to know the root causes of food waste in their restaurants to use the most efficient tools in their cases.

Great practices include the following preventive measures:

a) planning, organization, supervision, and awareness of employees can significantly contribute to reduce this waste and the financial loss generated and also favor safe and tasty food for users (GRATÃO et al, 2016);

b) the continuing education of both employees and users of the restaurant is extremely important because if the meals are not pleasant for those who consume, awareness makes the individual serve a small amount on his plate just to avoid waste. According to Villan and Alves (2010), the development of training for employees on the most efficient way to serve the users of the establishment is a great action to avoid waste and financial losses;

c) planning the quantities produced and monitoring losses daily are good alternatives to reduce food waste (PISTORELLO; CONTO; ZARO, 2015). According to Zanini (2013), a good way to reduce waste in restaurants is to identify and replace foods with low acceptance and a high rate of the waste. That is, one must study waste and stop or reduce the production of food that is not being appreciated by users. Through the daily weighing of food scraps, it is possible to assess user satisfaction and waste, being able to readjust production planning, both qualitatively and quantitatively (SILVÉRIO; OLTRAMARI, 2014);

d) According to the American website WebstaurantStore <https://bityli.com/qLclo>, a good way to reduce waste in a restaurant is to do a food waste audit to find out how much is wasted and what type of waste is being produced. In this way, it is possible to find ways to reduce them;

e) while Sakaguchi, Pak, and Potts (2018) bring broader and strategic thinking. The authors claim that joint action between stakeholders is needed. Therefore, it is important to partner with other companies, government, or society so that there is a joint effort to fight food waste, particularly in restaurants.

3. Methodology

The research is of an applied nature since it will offer practical contributions to the B_M restaurant to improve its management over time. As for the objectives, the research is descriptive since it studied and described the characteristics of organic waste existing in the organization, without changing the values of the variables involved.

Regarding the way, the information will be collected and analyzed, qualitative and quantitative approaches were used. According to Dalvoro, Lana, and Silveira (2008), in the quantitative approach, data collection emphasizes numerical information (or that which can be converted into numbers) that make it possible to verify the occurrence or not of the consequences, and then the approval or not of the assumptions. Regarding the qualitative approach, the same authors state that it works mainly with data that are not expressed in numbers or else the numerical information and the conclusions based on them play a minor role in the analysis.

Procedures involving case study, bibliographic research of articles, dissertations, and theses involving the topic were used to identify good practices for reducing food waste in the industry.

Also, documentary research (records, spreadsheets, waste inventory, destination certificates, etc.) was carried out with the sectors involved in the organization (SGI and restaurant sector).

For this, the research followed the following steps:

1st stage: carry out bibliographic and documentary research: 01/12/2019 to 03/01/2020

2nd step: Map the processes where organic waste is generated: 02 to 06/12/19

3rd stage: development of the questionnaire for field interview: 11 to 12/13/2019

The data collection and analysis instrument was developed based on questions 1, 2, 14, 15, 19, 21, 22, 25, and 26 of the interview questionnaire developed by Zanini (2013) in his master's dissertation, which he studied ways to reduce food waste in a university restaurant. The questionnaire (Appendix A) used in B_M, had 2 sections and 9 questions, with the first section focusing on collecting data on food waste, while the second section refers to the profile of the interviewee.

4th step: set the sample size and perform a pilot test: 12/16/2019

The population size is 997 employees who use the restaurant's services daily. So, using the online survey monkey calculator <http://bit.ly/32DDzGF> and taking into account a 90% confidence level and 4% error margin, the minimum sample size to be representative was 296 employees, which is why the goal was to randomly interview 300 employees who have lunch at the restaurant.

Once the questionnaire was prepared, a pilot test with 60 people was applied on 12/16/19 to check the level of comprehensibility by the respondents, and small adjustments were made to some questions to make them clearer at the time of the questionnaire. interview. Then the definitive test was started with the other employees.

5th stage: carry out a definitive test with the remaining 240 employees: 17 to 20/12/2019

6th stage: typing and analysis of results: 12/23/2019 to 02/02/2020

The responses were typed on a Typeform platform <http://bit.ly/2T70184>, which allowed the creation of an electronic spreadsheet, the construction of the graphs for descriptive analysis of the data <http://bit.ly/387xiV8>.

7th stage: write the article: 01/12/19 to 23/07/2020

8th stage: defense of the article, improvement, and final delivery: between 07/23 to 08/26/20

9th stage: translate the article into English and submit for review: 08/27 to 09/15/20

4. Discussion

4.1 Respondents Profile

In total, we interviewed 300 employees, with a technical tie between genders (51% = male; 49% = female).

In terms of age, the predominant age group was between 21 and 30 years old with 53% of respondents, while the second age group (29%) was between 31 and 40 years old, the third age group was between 21 and 50 years old with 11% of respondents.

Regarding the educational level, Figure 1 shows the percentages of the level of education among the 300 respondents, with the majority (67%) having complete high school, 16.7% as incomplete higher education, 11.3% have completed higher education, only 5% had until incomplete high school.

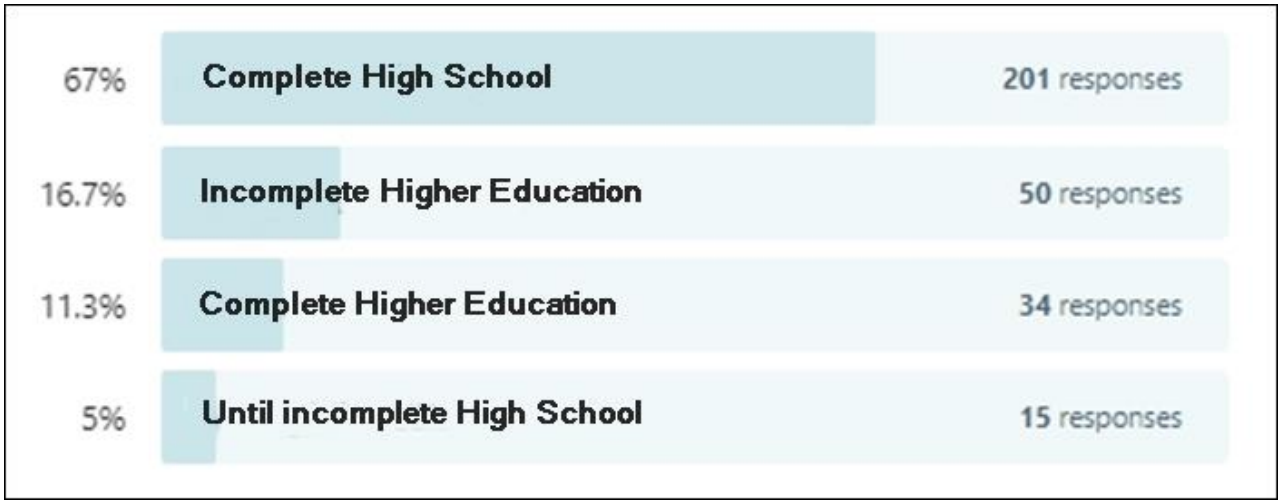

Figure 1: Last educational level of 300 respondents

Source: Author

4.2 Respondents' perceptions of food waste

Asked if they perceived food waste in the restaurant, the majority (94%) said yes, while only 6% answered that they did not perceive the problem. When crossing the results to find out if there were differences in the level of concern between genders, age groups, and levels of education, it was found that to gender (Table 4), women are 5.05% below that of men.

Table 4: Perception by sex about daily food waste in the restaurant

Gender	No	Yes	**Total**
Female	7,79%	92,21%	154 (51%)
Male	2,74%	**97,26%**	146 (49%)
Total Result	-	-	300

Source: Author

Regarding the age groups (Table 5), all were also above 90%, with the age group between 31 and 40 years standing out, with more than 97% of them reporting that they perceived food waste.

Table 5: Perception by age about daily food waste in the restaurant

Age	No	Yes	**Total (%)**
21 to 30 yes	6,25%	93,75%	160 **(53 %)**
31 to 40	2,27%	**97,73%**	88 **(29,3 %)**
41 to 50	8,82%	91,18%	34 **(11,3 %)**
Up to 50	5,56%	94,44%	18 **(6 %)**
Total Result	-	-	**300**

Source: Author

When analyzed by the level of education (Table 6), the highest level of perception (97.06%) is among those who have completed higher education. Then come those who have completed high school, with 95.12%. Among those with incomplete higher education, the percentage is 92%. Finally, among those who have not completed high school was below 91%. Thus, those with a higher level of education have a better view of the problem.

Table 6: Perception per schooling about daily food waste in the restaurant

Last educational level	No	Yes	**Total (%)**
Until incomplete high school	9,09%	90,91%	11 **(3,6 %)**
Complete high school	4,88%	95,12%	205 **(68,3 %)**
Complete higher education	2,94%	**97,06%**	34 **(11,3 %)**
Incomplete higher education	8,00%	92,00%	50 **(17 %)**
Total Result	-	-	**300**

Source: Author

4.3 Levels of concern about putting the right amount of food on the plate

When asked what was the level of concern about putting the appropriate amount on the plate, in order not to generate waste. 54% of respondents said they had a high or very high level of concern, 35% said they had an average concern and 10% said not to worry or have a very low concern.

When crossing the answers based on age, sex, and education, it was possible to find the following results (Table 7): concerning gender, the following was contacted that in both sexes, the average level of concern obtained a higher percentage, or that is, 35.71% for women and 34.93% for men. The percentage of women with concern at the High or Very High level was technically tied (54.55%) with the response of men (54.11%).

Table 7: Levels of concern with placing the appropriate amount on the plate (Gender)

Gender	Very high	High	Medium	Very low	None	Sub Total
Female (F)	24,03%	30,52%	**35,71%**	8,44%	1,30%	154
Male (M)	26,71%	27,40%	**34,93%**	8,22%	2,74%	146
Diference F-M	- 2,68%	3,12%	0,78%	0,22%	- 1,44	-
					Total →	300

Source: Author

Regarding age (Table 8), it was found once again that the Middle level was the one that obtained the highest percentages in all age groups, as there was 35.63% among those aged 21 to 30 years, 32, 95% among those aged 31 to 40 years, 41.18% among those aged 41 to 50 and 33.33% among those over 50 years old. At the High or Very high level, the highlight was for the age group between 31 and 40 years old (59.1%). On the other hand, people over 50 had the highest percentage (16.7%) of no or low concern.

Table 8: Levels of concern with placing the appropriate amount on the plate (Age)

Age	Very high	High	Medium	Very low	None	Sub Total
21 to 30 years	23,75%	30,00%	35,63%	7,50%	3,13%	160
31 to 40	31,82%	27,27%	32,95%	6,82%	1,14%	88
41 to 50	17,65%	29,41%	41,18%	11,76%	0,00%	34
Up to 50	22,22%	27,78%	33,33%	**16,67%**	0,00%	18
					Total →	300

Source: Author

Regarding the level of education (Table 9), it was found that individuals with complete higher education have the best levels of concern, as 73% of the responses in this group were divided into the High (32%) and Very High (41%) levels. Individuals who had not completed high school are those who had the least favorable results (18% High). Concerning the group with no (4%) or very low (10%) concern, those with incomplete higher education were those who had the worst result (14%).

Table 9: Levels of concern about putting the right amount on the plate (Education level)

Education	Very high	High	Medium	Very low	None	Sub Total
Until incomplete high school	0%	18%	73%	9%	0%	11
Complete high school	23%	30%	36%	9%	2%	205
Complete higher education	**41%**	**32%**	26%	0%	0%	34
Incomplete higher education	30%	26%	30%	**10%**	**4%**	50
					Total →	300

Source: Author

4.4 Main reasons for respondents to waste drinks (juices)

Respondents responded if they usually left leftover drinks (juices) and if so, what would be the reasons for wasting this item.

In response, the majority (256; 85%) reported that they do not waste drinks, while only 15% (44) acknowledged that they do.

Regarding the reasons why 44 (15%) carried out this waste, the majority (72%) did not like the taste of the drink, 29% claimed an inadequate temperature, 4% stated that it would be due to the high amount of liquid in the glass, while 18% cited other reasons.

In comparison to Zanini's dissertation (2013), on which the creation of the form was based. The results of this same question were different, as 47% stated that the reason would be the excessive amount of liquid in the glass, 33% claimed that the reason was that they didn't like the taste and 20% said the reason was the inadequate temperature of the drinks.

Respondents could choose more than one answer.

4.5 Main reasons why respondents said they left food on the plate

Respondents were also asked whether they left food scraps on the plate during lunch and what the reasons for the waste would be. If the interviewee claimed not to leave food scraps, then they were asked what, in his / her opinion, would be the reasons for the other employees to waste. As a result, of the 300 respondents, 173 (58%) of them confessed to leaving leftovers on the plate, and 127 (42%) said they did not have such an attitude.

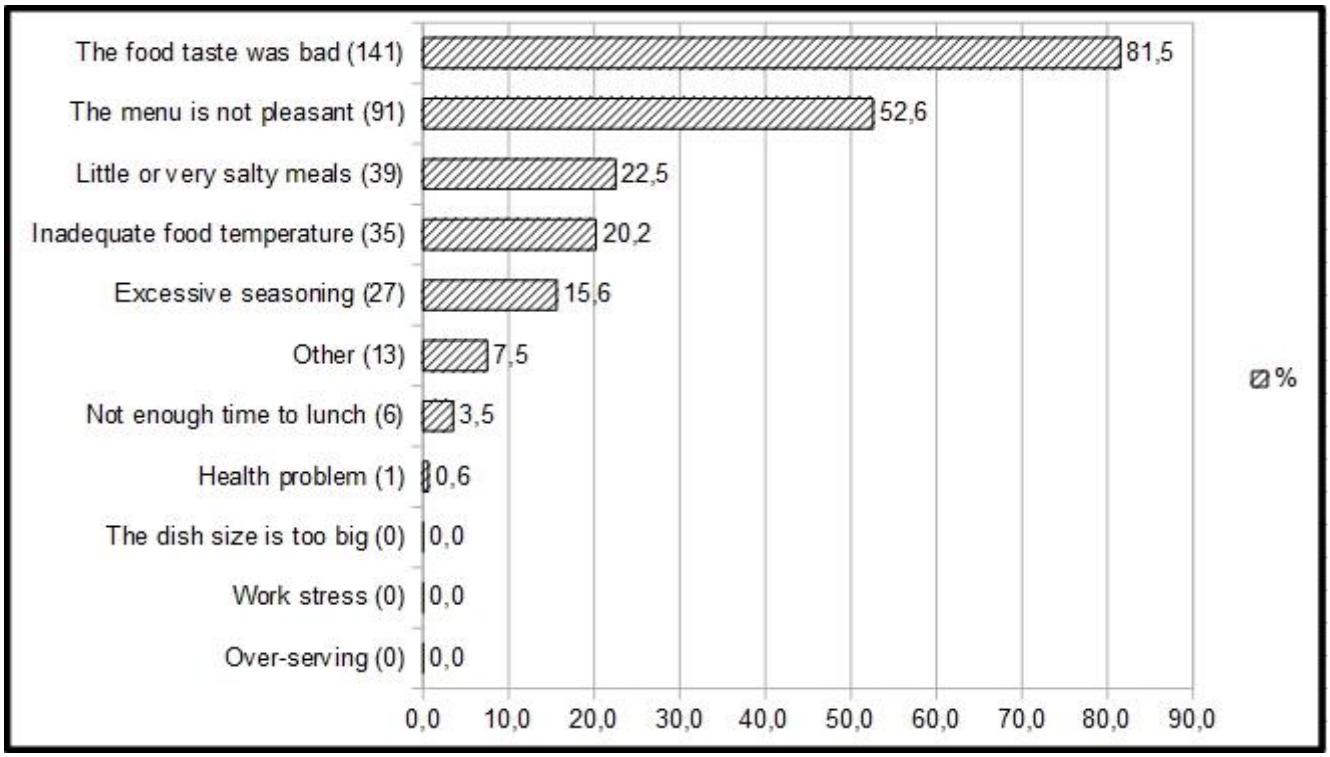

Figure 2: Main reasons for wasting food among those who claim to be wasting

Source: Author

In the opinion of the 173 who said they wasted, the five main reasons for leaving food scraps on the plate were (Figure 2): the food taste was bad (81.5%), the menu is not pleasant (52.6%), little or very salty meals (22.5%), inadequate food temperature (20.2%) and excessive seasoning (15.6%).

In Zanini's dissertation (2013), 51% of the interviewees stated that the main reason for the waste of food in the restaurant of the Federal University of Santa Maria-RS was also the food taste was bad, but with a difference of 30% concerning this work. In both surveys, the respondent could choose more than one reason.

4.6 Main reasons why other employees waste food

Based on the responses of 127 (42%) respondents who said they did not leave leftovers on the plate during lunch, but who gave their opinion on the reasons why other employees leave leftover food on the plate (Figure 3). The food taste was bad (51.2%) is the main reason, followed by an unpleasant menu (45.7%), over-serving (27.6%), inadequate temperature (14.2%), and little or no food very salty (11%).

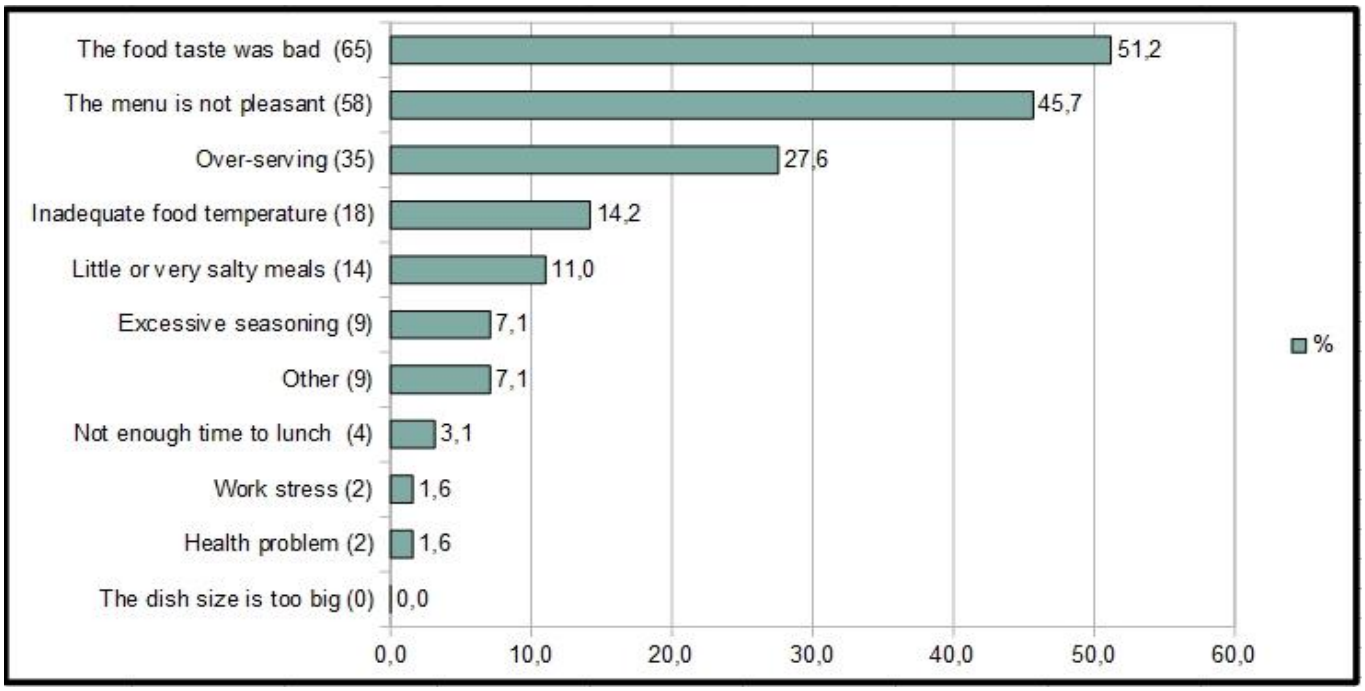

Figure 3: Main reasons for wasting food by other employees

Source: Author

When joining the responses of the group that recognized (YES, Figure 2) that wasted food and the group that said that it does not (NO, Figure 3) and gave an opinion on the reasons why the other employees do so, it is clear that the reason "Serving yourself in Excess" was not recognized by any of those who waste food. This may represent that these employees consider that the problem is the company and not generated by them, while the employees who said they did not waste, believe the on the contrary, as can be seen in Figure 4.

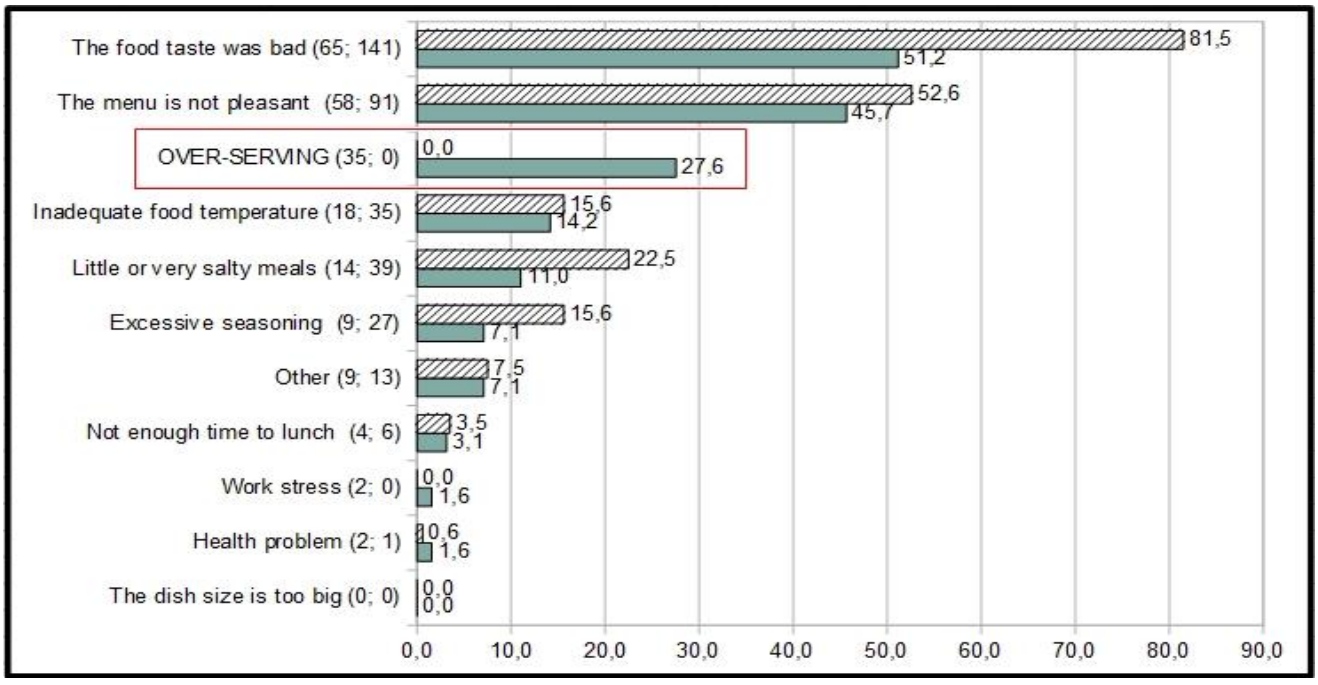

Figure 4: Difference in perception between the YES and NO groups about food leftovers

Source: Author

The other reasons followed almost the same order of classification, with only a difference between the percentages.

4.7 Most wasted food

The 300 interviewees responded to what foods they most wasted, even if rarely, during lunch. Almost all answered the question (299), results in Figure 5 show that the most wasted are in this order: beef (34.1%); chicken (32.1%); rice (23.4%); beans (20.7%), fish (20.1%), that is, meat waste exceeds that of grains. More than once, respondents could choose more than one option.

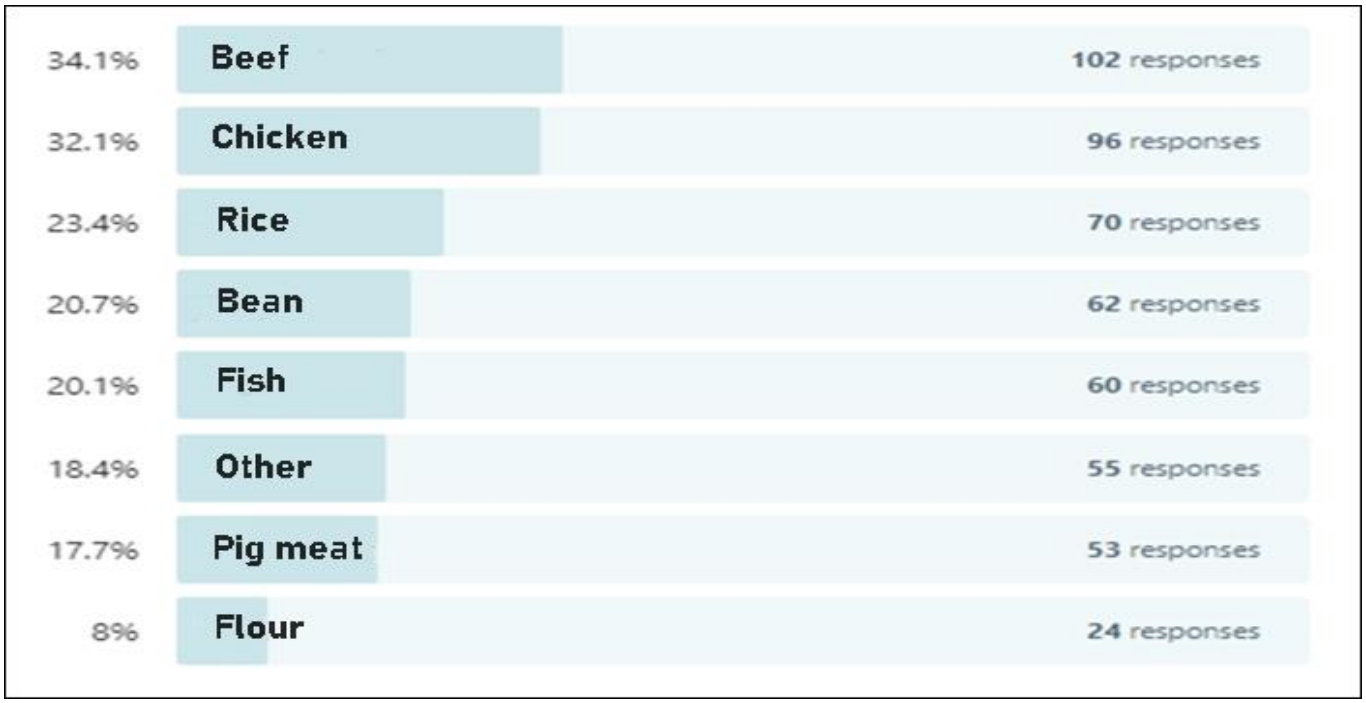

Figure 5: Main wasted foods

Source: Author

4.8 Actions to reduce food waste

The last question invited respondents to propose possible solutions to reduce food waste.

Among the 300 interviewees, 160 (53.3%) gave at least one suggestion, most cited were: preparation and improving the menu (23.1%); improve seasoning (17.5%); change the restaurant (10%); improve the taste (9%); make users aware (5%); improve service (3.75%); improving drinks (3.75%); offer a more varied menu (3.1%); serve in the appropriate amount (3.1%); improve the cooking of meat and chicken (2.5%); reduce oil (1.9%); produce healthier foods (1.9%); use two counters to reduce queue size and time (1.9%); put little food on the plate (1.9%), etc.

It was noted that the suggested improvement focused on the preparation of the meals, since most (81%) of the suggestions were focused on this phase of the process. However, it is worth noting that one-tenth of the respondents prefer to change service providers.

5. Conclusion and recommendations

The general objective was to analyze the causes of food waste in the B_M company restaurant, to propose actions to improve its environmental performance.

A questionnaire was applied to 300 employees interviewed at random, whose analysis of the data led to the following conclusions and recommendations:

a) waste is related to the preparation and menu of meals, occurring effectively in the consumption phase when people serve themselves and leave leftovers in the dishes;

b) the majority (94%) of the interviewees perceive that there is food waste in the restaurant. Men have a slightly higher perception (97.3%) about food waste compared to women (92.2%), employees between 31 and 40 years old (97.73%), as well as having completed higher education (97, 06%) also have a higher perception when compared to the others. However, the results indicate that there is no significant difference of opinion between genders with placing the appropriate amount of food on the plate. But employees over 50 years old, as well as those who have not completed high school or higher education incomplete, were those who had the lowest level of concern about putting the proper amount of food on the plate. Thus, it is recommended to build a participatory awareness program with employees, consisting of lectures, suggestion boxes, continuous assessment of satisfaction, presentation of results with corrective and preventive actions, as well as recognition of those who help to reduce waste at the restaurant;

c) about 15% of the interviewees waste drinks, due to the taste, the inadequate temperature, and the high amount of liquid in the glass. The results are different from the research conducted by Zanini (2013) in a university restaurant;

d) Besides, a little more than half of the interviewees leave food scraps on the plate, due to the bad taste of the meals, unpleasant menu, salt level, temperature, and seasoning. It was also observed the possibility of waste due to the employee being over-served;

e) among the good practices identified that can reduce food waste in the B_M restaurant, we can mention:

e1) the proposal by Gratão et al (2016) which focuses on the planning, organization, supervision, and awareness of employees who prepare food and drink for employees;

e2) plan the quantities produced and monitor losses daily, replacing foods with low acceptance and with a high rate of the waste. In this sense, managers are recommended to analyze the suggestions for improvements proposed by customers, as well as create a dialogue channel with them to know the main reasons why they waste meat and grains in general;

e3) improving the phase of preparing meals, through better handling of spices, adoption of new gastronomic techniques, and adaptation of the menu to the preference of users;

e4) to carry out periodic audits on food waste, to identify the main wasted foods, changes in users' preferences, and to find improvements or worsens in the waste rates determined so far;

e5) make adjustments to strategies to combat waste whenever necessary;

e6) make use of automation systems to know which are the days and times with the highest flow of people, the most accepted and rejected dishes, the average consumption of each person, and also important information to assist the forecast of inputs for the restaurant.

The limitations of the research are: did not focus on the preparation of meals to know if the ingredients and seasonings are of good quality; the physical conditions of the work environment and emotional conditions of the restaurant employees were not verified. Because of this, it is recommended to conduct an organizational climate survey and/or others that are geared to the motivational and unhealthy part of restaurants.

6. Appendix A – Questionnaire

SECTION 1: Reasons for food waste

1.1 - Do you notice daily food waste in the restaurant? a) yes b) no

1.2 - What is your level of concern with putting the proper amount of food on the plate? a) None b) Very Low c) Medium d) High e) Very high

1.3 - Do you usually leave leftover drinks? a) yes b) no

1.4 - If so, what is the main reason? (you can check more than one)

a) unpleasant taste b) inadequate temperature c) too much in the glass d) Other

1.5 - Do you usually leave food scraps on the plate? a) yes b) no

1.6 - If so, could you provide the main reasons?

a) the menu is not pleasant	b) I over-served myself	c) the taste of the food was bad
d) the temperature was inadequate	e) excessive seasoning	f) due to health problems
g) too little or too salty	h) the dish is too big	i) work stress
j) insufficient time for lunch	l) other	

1.7 - If not, what are the reasons the employees leave food on the plate?

a) the menu is not pleasant	b) I over-served myself	c) the taste of the food was bad
d) the temperature was inadequate	e) excessive seasoning	f) due to health problems
g) too little or too salty	h) the dish is too big	i) work stress
j) insufficient time for lunch	l) other	

1.8 - When you leave food, what are the foods usually?

a) Beef b) Pig meat c) Fish d) Chicken e) Rice f) Beans g) Flour h) Other

1.9 - What actions would reduce food waste in the restaurant?

SECTION 2: Profile of Respondents

2.1 Gender: a) Male b) Female

2.2 Age: a)> = 20 years old b) 20 and 30 years old c) 31 and 40 d) 41 and 50 e)> = 50

2.3. Last educational level

a) Until incomplete high school b) Complete high school

c) Incomplete higher education d) Complete higher education

7. Acknowledgment's

Thank to Company B_M for the opportunity to conduct the research. To Doctors Marly Guimarães Fernandes Costa and Dalton Chaves Vilela Júnior, for coordinating the Postgraduate course in Engineering and Industrial Management;

Thanks to the supervisor, Prof. Dr. Jonas Gomes da Silva, for the support, encouragement and corrections;

Thank to Doctors Elaine Ferreira and Fabiula Meneguete Vides da Silva for the recommendations for improvements during the defense of the article on the board held in August 2020.

Finally, as provided for in Article 48 of Decree No. 6,008/2006, this work was financed by Flex Industries, under the terms of Federal Law No. 8,387/1991, within the scope of the Priority Project for Human Resources – CAPDA/SUFRAMA, coordinated by the Muraki Foundation and executed by the CETELI of the Federal University of Amazonas – UFAM.

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Model to classify and reduce rework in the production of digital routers in a PIM Company.

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Abstract

Rework has been a challenge for organizations, especially in Brazil, where there is still a lot of waste of resources (IDB, 2018; EMBRAPA, 2018). This case study aims to contribute to improving the classification and reduction of rework in the sectors involved with the production of digital routers from the company EX da Amazônia (fictitius name), located in the Industrial Pole of Manaus. To this end, bibliographic research and methodology with seven phases, allowed to develop and apply a questionnaire to 71 employees who work in seven sectors involved with the processes of the organization's digital routers. The analysis was carried out with descriptive statistics, which allowed the identification of the best concepts for the term, the main problems, their causes, and effects, as well as reaching the main conclusion that the best model to classify and reduce reworks in the organization, must be developed by senior management, based on an interdepartmental approach, with diagnoses of the situation in each department, as well as the adoption of an annual plan to combat rework, supported by the use of information and communication technologies, awareness campaigns, continuous training, IT tools, quality approaches for improvement projects, audits, standardization, identification and dissemination of good practices, and recognition of employees.

Key-words: Rework; Classification; Conceptual Model;

1. Introduction

An analysis by employees of the Inter-American World Bank (IDB, 2018) pointed out that in terms of fiscal spending, in Brazil and other Latin American countries; there are inefficiencies and waste that could add up to close to 4.4% of GDP. Another study by EMBRAPA with FGV revealed high food waste in Brazil annually, where each Brazilian wastes 41.6 kilos of food (EMBRAPA, 2018).

Waste is something that the consumer does not want to pay (SLACK et al., 2002). In Brazil, this problem is not only present in the public sector, in the rural area or homes, but also in the industries,

generally related to rework, being considered enemies that affect the competitiveness of any company.

This research is a case study carried out at the company EX da Amazônia located at PIM (Manaus Industrial Pole), with 19 suppliers and 1264 employees. It assembles printed circuit boards in microwave ovens, chargers for notebooks, remote controls, and digital routers, which account for 80% of annual revenue in 2018 and 2019.

In productive terms, the company divides its products into these four families: remote controls, sources, digital routers, and several, which go through two processes, the assembly of printed circuits in automatic insertion and the finishing in the production sector.

The research focuses on the family of digital routers. In nine months (January to September 2019) was identified that they have high cost in rework, with a peak of 30 thousand reworks in a specific product, due to changes in the project by the supplier, with lost productivity, late deliveries, and customer dissatisfaction.

The production of routers, there is a chain of actions that go through various sectors that involve about 284 employees, as shown in Table 1.

Table 1: Number of employees involved in the production of routers at EX da Amazônia.

Sector	Number of employees	Sector	Number of employees
Purchasing	3	Automatic Insertion	18
Engineering	3	Manual Insertion	237
Production Planning and Control	2	Quality	11
Warehouse	8	Expedition	2
	Total of employees: 284		

Source: EX da Amazônia (2019)

Regarding the production process of digital routers, there are the following steps: the automatic insertion (AI) of surface mount components known as SMD (Surface Mounted Device) and manual insertion (IM), the latter being the one that has registered the higher number of reworks in the company.

1.1 Problem and key question

Each sector involved in the production of routers has specific assignments, whose employees may receive or generate dysfunctions in their processes that end up culminating in the execution of rework, unnecessary efforts to do again one or more activities performed in the wrong way the first time (LOVE, 2002).

The company has used the Return Merchandise Authorization (RMA) approach to try to manage the rework. Its script starts with a rejection in the production process in which the quality or production identifies the fault, rejects the batch, segregates it to be again reprocessed on the production line, or overhauled elsewhere.

Currently, the company is seeking to computerize processes to improve data management with the areas involved, to reduce losses caused by rework. So, the research problem lies in the fact that there is no

accurate system or conceptual model to classify and monitor reworks to identify the causes and propose solutions aimed at reducing them.

Thus, the question of the study "What is the best model for classifying and reducing rework in the sectors of the EX da Amazonia, involved with digital routers?"

1.2 Objectives

The general aim is to contribute for the improvement of the classification and the reduction of rework in the sectors involved with the production of digital routers in the EX da Amazônia.

The specifics objectives are: a) identify conceptual models that classify, analyze and help reduce rework; b) to identify the main problems that generate rework with a high impact on the company's costs; c) Identify the effects of rework for the investigated company; d) propose a conceptual model that allows classifying and reducing rework.

1.3 Importance of Research

The research contributes to helping in the computerization process adopted in the organization. It also helps to reflect on the concepts that involve rework, as well as finding ways to classify and reduce them over time, positively impacting productivity, increasing employee morale, reducing costs, and customer satisfaction, not to mention the environmental benefits.

For the academy, the research adds a case study for teachers who teach related quality management classes, as well as for researchers interested in the topic to conduct new research.

For society, the research contributes to the reduction of environmental problems generated by rework, as well as serving as a benchmark for other companies.

2. Theoretical Reference

2.1 Rework around the world

Several authors have already researched rework. Tables 2, and 3 points out that most of the more systematic studies are developed abroad focused on costs and the civil construction industry.

Table 2: Impact of rework on construction companies in 5 countries

Authors	Abstract
Barber et al. (2000)	In the United Kingdom, costs of quality failures in two overpass construction projects were studied, ranging from 16% to 23%, including the cost related to the delay, if removed, the cost of quality failures would be between 3.6% and 6.6%
Josephson et al. (2002)	A study carried out in Sweden revealed that the costs of the defects identified in 7 building construction projects ranged between 2.3% and 9.3% of the contract value. In another study also in Sweden, the costs of quality failure represented about 6% of the original contract value;
Fayek et al. (2003)	A survey of 108 rework incidence fields in Canada revealed the following cost indices: (a) Engineering and Revision = 61.65%; (b) HR = 20.49%; (c) Materials and Equipment Supply = 14.81%; (d) Construction Planning and Control = 2.61%; and (e) Leadership and Communication = 0.45%;
Rhodes, and	In South Africa, the cost of rework was 13% of the value of the completed work.

Smallwood (2003)	
Love, and Edwards (2004) Love (2002)	An organization representing the Construction Industry in Australia has identified an average cost of rework of 6.5% compared to the contract value for projects without a quality management system (QMS). On the other hand, they found that the cost of rework for projects with QMS was on average 0.72%; In another study in Australia carried out with 161 projects, it was found that the average costs of direct and indirect rework varied 5.6% and 6.4% of the value of the original contract.

Source: Ekambaram (2006 p. 5.2)

For example, Ekambaram (2006, p. 52) pointed out six international surveys (Table 2) on the impact of rework on the financial performance of the civil industry in countries such as the United Kingdom, Sweden, Canada, South Africa, and Australia, with the cost with rework representing in some cases up to 23% of the value of a project.

Mastenbroek (2010) found that the costs attributed to rework in civil construction in different countries can vary between 1% to 12.4% of the total costs of the project (Table 3), also considered the possibility that reworks costs are higher in developing countries than in the western countries where most of the research took place.

Table 3: % of the cost of reworking construction projects in several countries

Authors	**Country**	**% of Cost**
Cusack (1992)		10 *
Borroughs (1993 apud MASTENBROEK, 2010)		5 *
CIDA (1995)		6,5 *
Lomas (1996 apud MASTENBROEK, 2010)	Australia	>1*
Love et al. (1999 apud MASTENBROEK, 2010)		2,4 e 3,15*
Love (2002)		6,4*
Cidb (1989 apud MASTENBROEK, 2010)	Singapore	5 a 10 **
Burati et al. (1992 apud MASTENBROEK, 2010)	USA	12,4 **
Abdul e Rahaman (1993 apud MASTENBROEK, 2010)	England	2,5 a 5 *
Hammarlund et al. (1990 apud MASTENBROEK, 2010)	Sweden	6 **
Josephson e Hammarlund (1990, 1996 apud MASTENBROEK, 2010)	Sweden	2,3 a 9,4 *
Observation: *% of the contract value; **% of project cost		

Source: Mastenbroek (2010)

2.2 Rework in Brazil

No research has been identified on models for classifying and reducing rework in Brazil, and there is little research on the impact of rework on the performance of Brazilian organizations, similar to EX da Amazônia.

However, it is possible to highlight the results of the Federal Government's More Productive Program (P+B), launched in 2016 to stimulate the competitiveness of companies, especially small ones, through consultancies carried out by SENAI professionals in the process of manufacturing to identify and reduce waste through the implementation of lean manufacturing tools.

The methodology was developed by the National Industry Center (CNI), using lean manufacturing tools to reduce overproduction, waiting time, transportation, over-processing, inventory, movement and rework. These gains are for approximately 3000 small and medium companies, operating in the food and beverage, metalworking, furniture, and clothing and footwear sectors.

A report was published in 2018 by the Economic Commission for Latin America and the Caribbean with IPEA (ECLAC, IPEA, 2018). Which revealed that:

a) the average reduction in rework was 64.82% in the benefited companies; b) the industrial sectors with the substantial reductions in rework (Figure 1) were clothing and footwear (Vestuário e calçados = 70%), followed by metal mechanics (66%); c) Small companies had the massive average reduction in rework (71.4%); d) the states of Rio Grande do Norte, Tocantins, and Acre had the highest rates of average reduction in rework, while Ceará, Amazonas, and DF had the lowest performances (Figure 2).

b)

Figure 1: Average reduction (%) of rework by sector
Source: CEPAL and IPEA (2018)

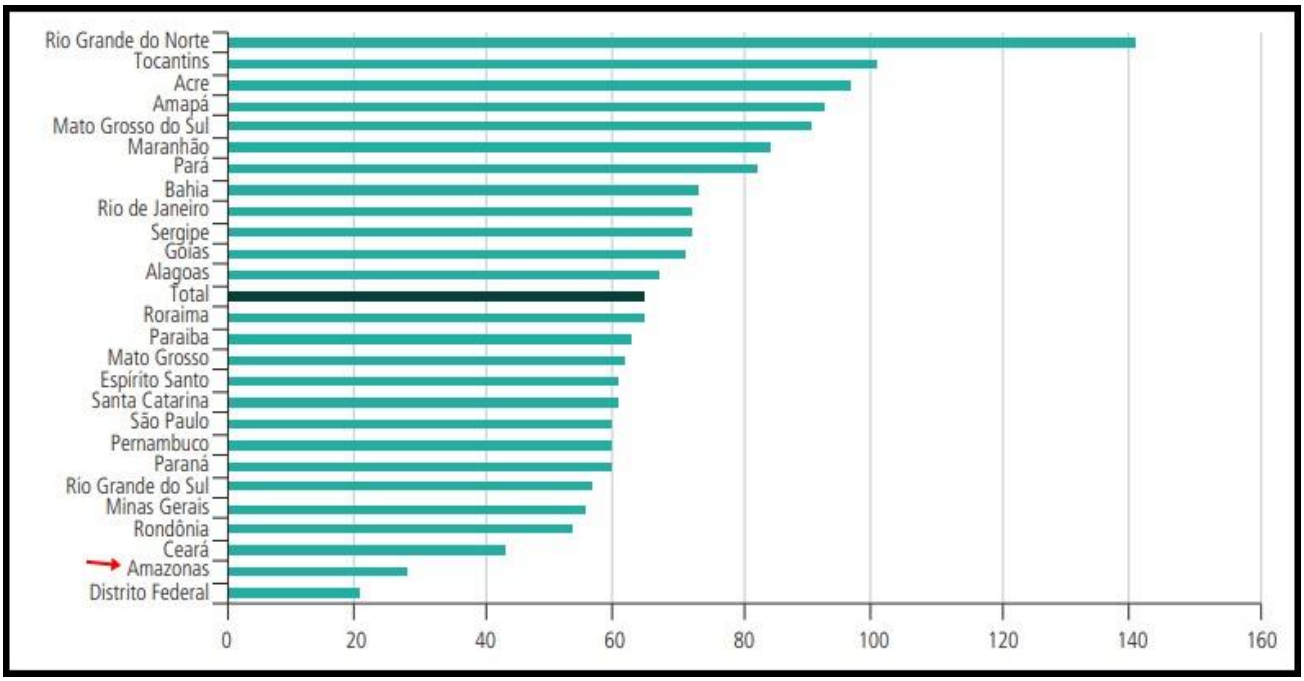

Figure 2: Average reduction (%) of rework by State
Source: CEPAL and IPEA (2018)

Another research was developed by De Souza (2018) with eight companies in the IT area, developers of business management systems. Which identified that the resistance of managers, the client, internal conflicts, the poor qualification of the developer professionals, the personal insecurity of the client and employees, the excessive empowerment of the commercial sector, the reactivity of the client's employees, the distance from the professionals, the deficient training and the implementation planning were considered elements that induce rework.

To alleviate these problems, De Souza (2018) recommended approaching designers and service professionals, conflict management, valuing users' opinions, training, selecting the profile of users, and managing project resources.

2.3 Rework concepts and models for classifying them

Mello et al. (2018) believe that rework is the execution of extra activity to meet a standard that was not achieved in its normal process, where reprocessing is necessary to meet the original requirements of the product, rework is also the correction of imperfection out of quality specifications.

For the authors Hwang et al; (2009), rework means that a job must be redone because of not meeting the requirements. The authors Love and Li (2000) are well known as experts on the subject with several publications, affirms that rework means the effort to redo a process or activity that was implemented incorrectly for the first time.

The authors Josephson, Larsson, and Li (2000) developed a concept that was limited to the construction industry, a rework means an unnecessary effort to correct errors in construction.

Mastenbroek (2010 p. 4) agrees with what was proposed by Love and Li (2000), who used the studies of Farrington (1987) to classify rework in four categories, namely:

Category 1) Change: a targeted action that changes the requirements established;

Category 2) Error: an item or activity in a system that is developed incorrectly;

Category 3) Omission: some part of a system has been forgotten, not executed;

Category 4) Damage: damage caused by employees, contractors, weather conditions, or natural disasters.

To achieve the objectives of his research, Mastenbroek (2010, p.7) proposed a model to try to categorize the sources and consequences of rework (Figure 3).

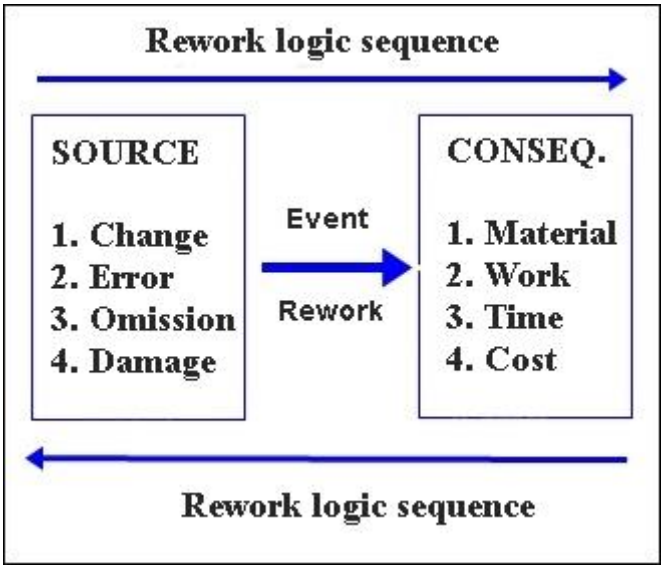

Figure 3: Classification of reworks
Source: Mastenbroek (2010 p. 7)

The sources have the four categories mentioned, while the consequences were classified as indicators, divided into 1. Material; 2. Work; 3. Time; 4. Cost.

Regarding the consequences, Mastenbroek (2010) presented some examples extracted from the literature review. Such as delays in the delivery of projects, extra work, increased costs, increased scraps, stress, fatigue, interdepartmental conflicts, downtime, demotivation, reduced profits, damage to the image of the professional, and even the company, dismissal, dissatisfaction of customers or users, etc.

In summary, this author developed an interesting methodology to measure the costs of rework in the civil construction industry, to identify, classify and analyze 45 causes that generated rework in the design and construction processes, identifying together with the collaborators the most severe and causes impact and proposed improvements to reduce them.

Wasfy (2010) studied two models of rework. The first conceptual model points out the causes of rework and its impacts on the productivity and performance of a project, while the second model classifies the causes of rework.

The first model (Figure 4) used was proposed by Love and Edwards (2004), which consists of three factors that directly and indirectly impact rework. They are the characteristics of a project, the organization's management practices, and project management practices. These factors influence the productivity and performance of the project.

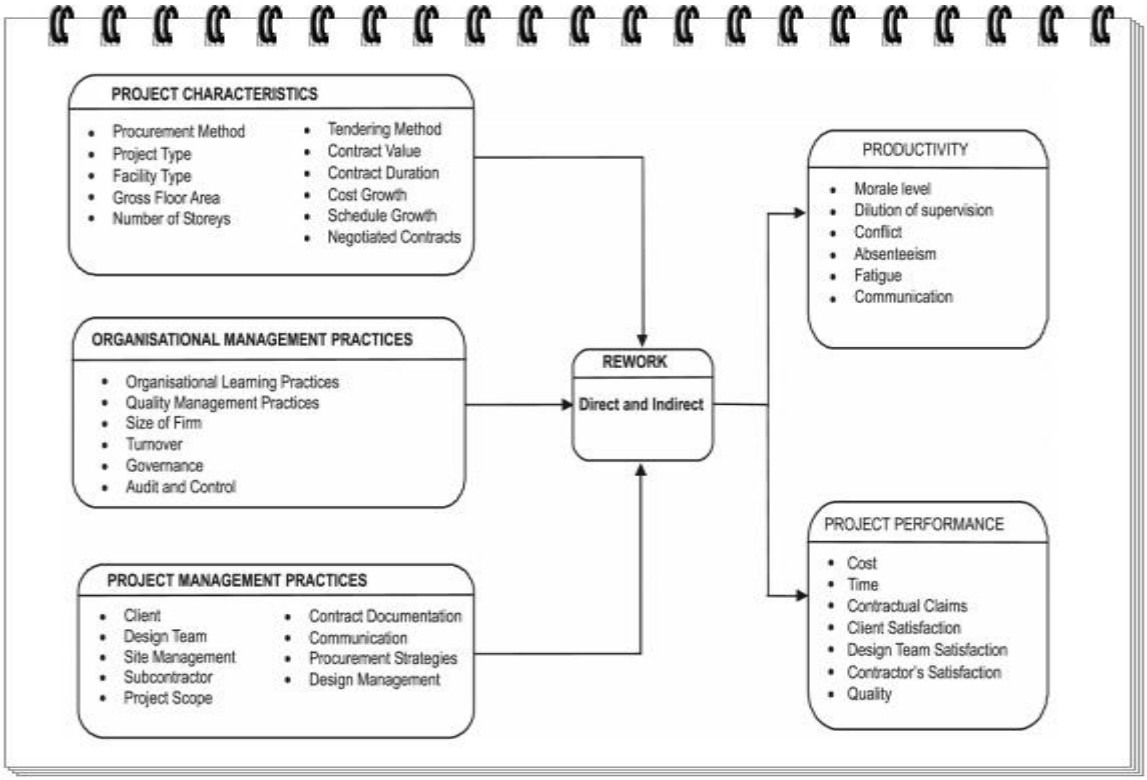

Figure 4: Conceptual Model containing the factors and impacts of Rework

Source: Love and Edwards (2004, p. 261)

In summary, Figure 4 points out that the characteristics of the project, organizational management practices, and project management practices can influence the rework and performance of a project. Project features include acquisition method, project type, facility type, contract value, contract duration, etc. Among the organization's management practices are organizational learning practices, quality management, company size, turnover, governance, audit, and control.

And concerning project management practices, we can mention the design team, subcontractors, the scope of the project, contractual documentation, communication, project strategies, and design management.

Among the effects of rework on productivity are impacting on employee motivation, conflicts, absenteeism, fatigue, etc. Besides, rework affects not only costs and scheduling, but also has a negative influence on the relationship between departments and the well-being of employees (LOVE and EDWARDS, 2004).

Regarding the effects of rework on project performance, there are impacts on costs, delivery time, contractual dispute and dispute, customer satisfaction, etc.

Another model (Figure 5) studied by Wasfy (2010) was proposed by COAA (2001) to classify the causes of Rework.

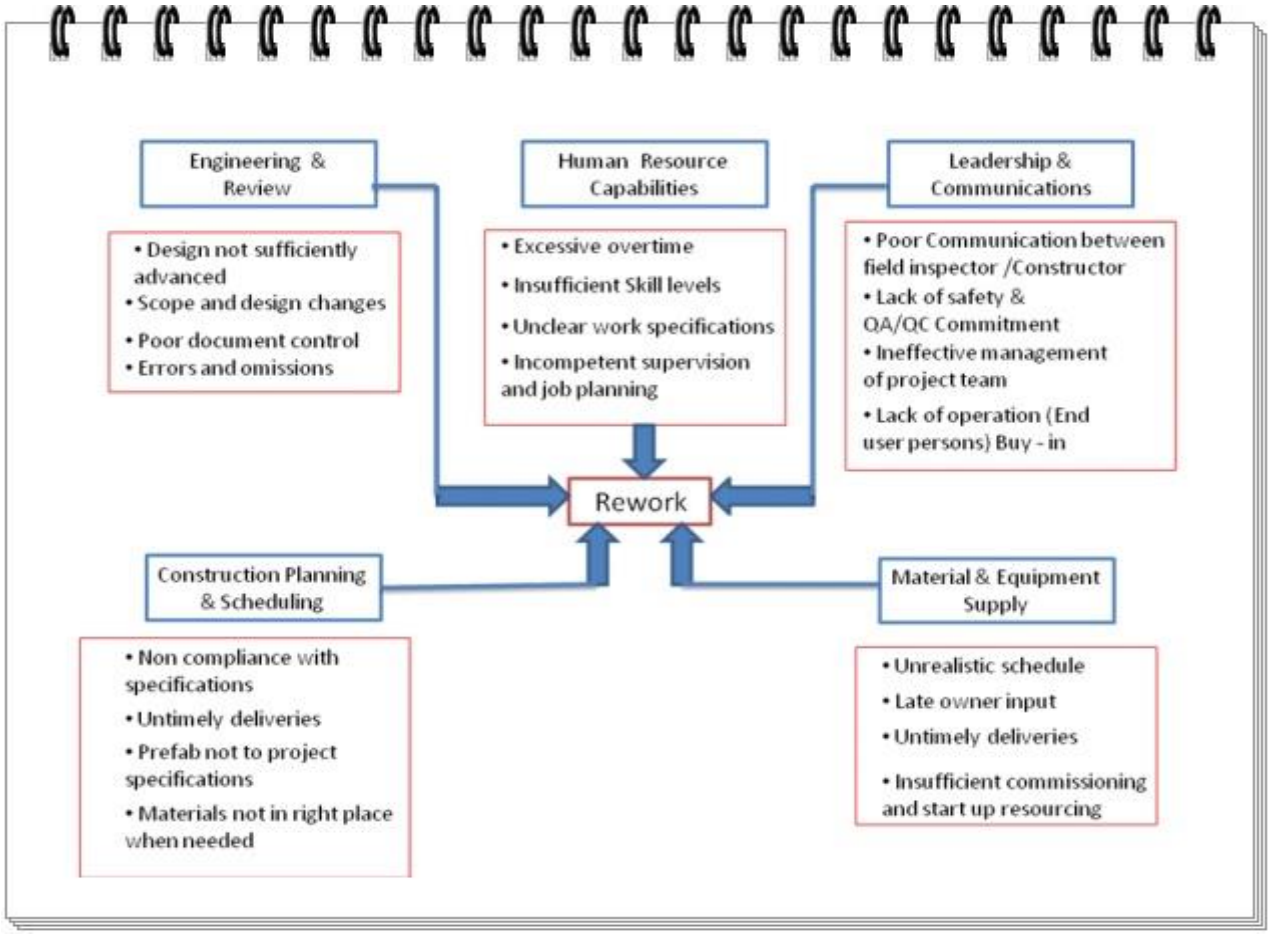

Figure 5: Model for Classifying the Causes of Rework
Source: COAA (2001)

This model has five factors that can group the causes of rework:

a) Engineering and Revision: not sufficiently advanced design, changes in scope and design, poor documentation control, errors, and omissions;

b) Human Resources Capabilities: excessive overtime, insufficient skill levels, unclear job specifications, incompetent supervision, and poor work planning;

c) Leadership and Communications: poor communication between the inspector and the builder, lack of security, lack of commitment to quality assurance and/or quality control, inefficient management of the team, etc;

d) Construction Planning and Programming: failure to meet specifications, premature deliveries, materials out of place when needed, etc;

e) Supply of Material and Equipment: unrealistic programming, late entries by the owner, late deliveries, etc.

Based on these two models, as well as on his experience, Wasfy (2010) suggested the model proposed in Figure 6 to classify the causes of rework.

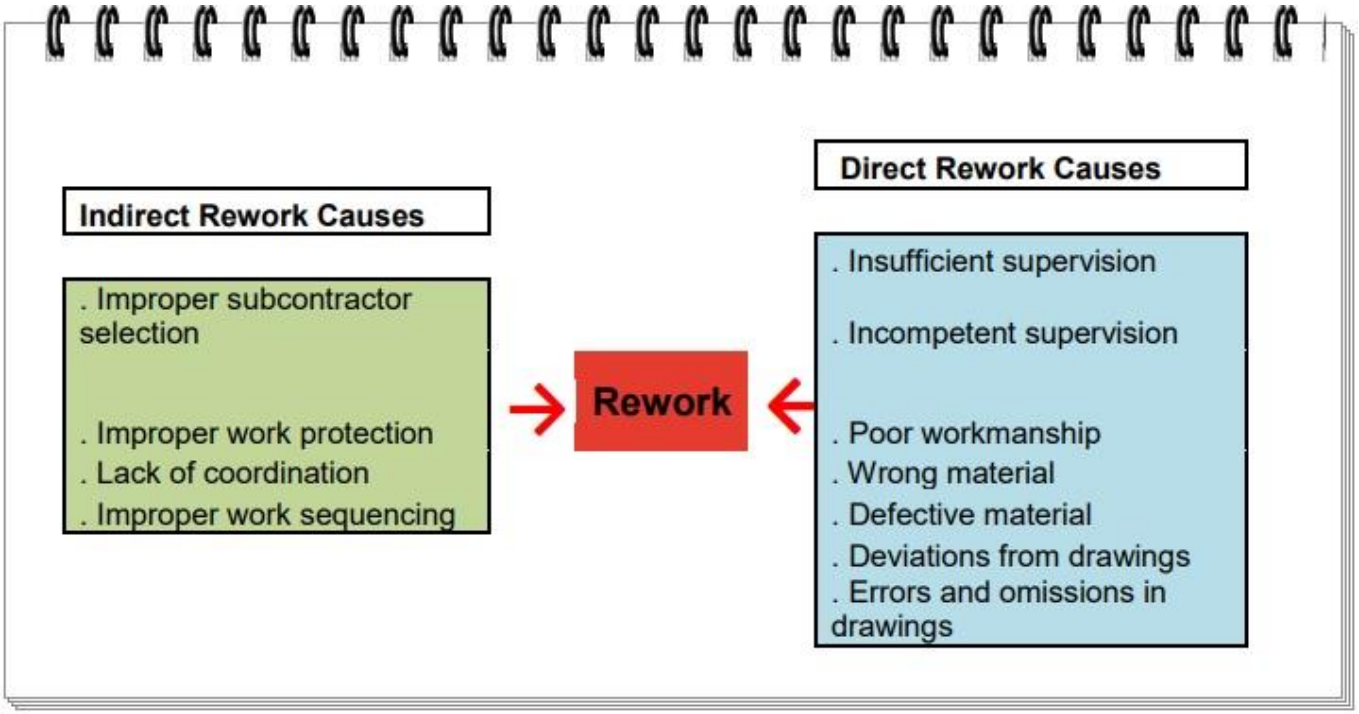

Figure 6: Model for classifying indirect and direct causes of rework

Source: Wasfy (2010 p. 28)

The model proposed by Wasfy (2010) classified the causes in two categories. The first contains the causes of rework that occurred indirectly, involving the inadequate selection of the subcontractor, inadequate work protection, lack of coordination, as well as an inadequate sequence of work.

The category containing the direct causes of rework: insufficient and incompetent supervision, inadequate labor, incorrect material, defective material, errors, and omissions in the drawing, etc.

Several issues need to be considered to reduce or minimize the occurrence of rework in construction projects, such as changes, the use of information technologies, the training of supervisors, the quality control plan, the inspection project, etc. (WASFY, 2010, p. 31).

Other authors frequently cited in research to classify rework in the construction field are Fayek et al. (2004) that conducted a study to establish great practices and indicators for construction companies to reduce overwork in Canada. These authors were also inspired by the model in Figure 5 to develop the methodology presented in Figure 7 to collect data, generate indicators, and monitor events related to rework.

To facilitate data collection, they developed a system called the Field Rework Data Collection System (FRDCS), using Microsoft Access 2000 software together with the Microsoft Visual Basic 6.0 interface.

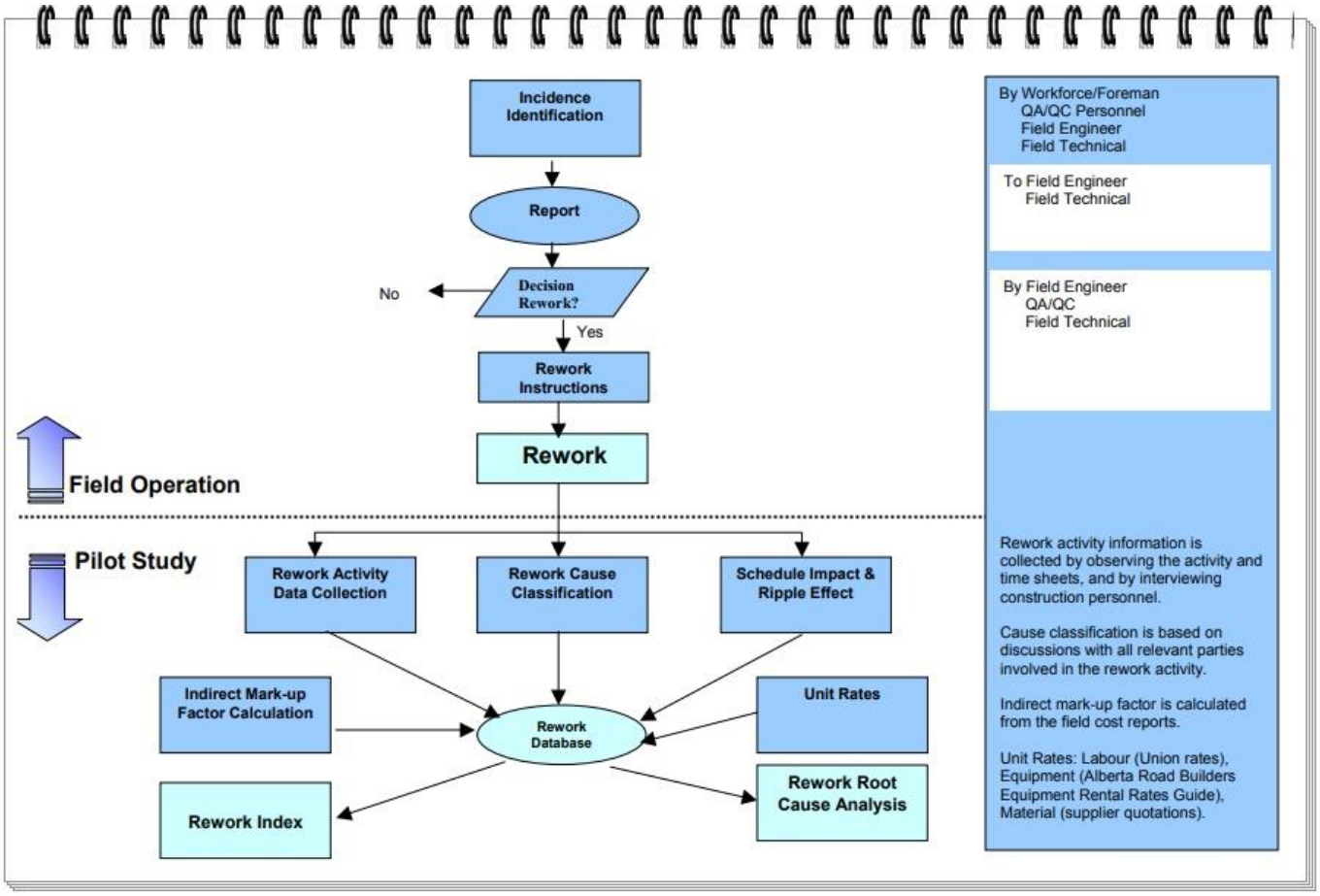

Figure 7: Methodology proposed by Fayek et al (2004) to collect data on Rework

Source: COAA (2003, p. 21)

This system allows the elaboration of several graphs, through which it is possible to analyze the trend of rework, which impacts on costs and deadlines, to develop strategies to reduce the problem. The details of the study carried out by Fayek et al (2004) in Canada can be seen in the Research Report published by COAA (2003).

In short, the methodology begins when an incident is identified in the field, which involves something to be redone over time. The professionals who identify these incidents can be operators, supervisors, technicians, engineers, Quality Control employees, etc.

Depending on the type of incident, they can report the matter to their respective bosses to obtain instructions, which can be classified into two categories, or the job is redone or accepted as it stands.

If it is decided to rework, managers need to provide resources, instructions on the processes and set a deadline for completion. Besides, there was a concern to create a database to register the characteristics of rework, involving causes, classification, indicators, etc.

3. Methodology

The research is of an applied nature since it will offer practical contributions to the EX da Amazônia company to face rework over time.

As for the objectives, the research is descriptive since it will study and describe the characteristics of

rework, its causes, and consequences in the organization.

Regarding the way the information was collected and analyzed, the combined approach (qualitative and quantitative) with procedures involving bibliographic research of articles, dissertations, theses were used, aiming at the formulation of the conceptual model and its tools, as well as a case study, the latter being an empirical investigation that investigates the contemporary phenomenon within its real-life context, especially when the boundaries between the phenomenon and the context are not clearly defined (YIN, 2005 p.32).

Also, for data collection, a questionnaire was developed and applied to the main employees in the sectors involved with the planning and production process of digital routers.

For data analysis, an electronic spreadsheet, descriptive statistics, PDCA (Plan, Do Check and Action), and SCORE Matrix were used, as detailed in the research steps.

The research steps are:

1st stage) State of the art review: until December 20, 2019

2nd phase) Meeting at the Company to obtain support and explain the project: 11/27/19;

3rd phase) Construction of the data collection instrument: 27 to 29 November 2019

The questionnaire has 19 questions and was developed using part of the models of the aforementioned authors, whose structure and content can be viewed on the Typeform platform <https://bit.ly/30Xyc64>, which can be answered digitally through QR Code with the possibility of a reply via cell phone, tablet, computer or another electronic device. Besides, the printed questionnaire was delivered to members of the sectors, considered the most experienced and accessible.

4th phase) Definition of the type of sampling and data collection strategies: 11/13/2019

Due to the 284 employees involved with digital routers being very busy professionals, It was tried to carry out sampling for convenience, where the researcher selects more accessible members of the population (SCHIFFMAN, L. & KANUK, 2000), prioritizing experienced employees and their availability to participate in the research. As a result, a confidence interval or margin of error was not adopted.

5th phase) Application of the pilot test: November, 29 to December 3, 2019

The pilot test was carried out using the electronic questionnaire applied to 5 employees, where it was possible to make changes to some questions to make the survey easier to understand and answer.

6th phase) Improvement of the questionnaire and application of the definitive test: 04 to 12/20/2019

7th phase) Data verification, typing, and analysis: 12/04/19 to 03/30/20

8th phase) Partial presentation of results: 12/17/19

9th phase) Elaboration of the model and article: January, 5 to August 15, 2020

10th phase) Defense, improvement, and final delivery of the article: 08/23 to 09/10/20

4. Discussion

4.1 Respondents profile

Seventy-one employees correctly completed the questionnaire, which represents 25% of the 284 employees involved in various processes of the digital routers.

Regarding the position of the respondents' position, it was observed that the majority (49; 69%) act in

operational level positions, a little more than a fifth (16; 22.53%) act in a tactical level, and only 6 (8.4%) work in strategic level positions.

Concerning the department where they work, two work in the Production Planning and Control, for work in Purchasing, 3 in Engineering, 4 in the Warehouse, 46 work in Manual Insertion, 7 are in Automatic Insertion, 3 in Quality, and two are in Expedition.

4.2 Choice of the rework concept to be adopted in the Company

Question 1 presents four concepts of rework and asks the respondent to choose one that would best help in standardizing the term in the company.

The results in Table 4 show that the two most prominent concepts were "Redo something that was done incorrectly in the first time" with 48% of the votes and "Action to correct changes, errors, omissions or damages" with 32% of the answers. These two concepts stand out in all sectors when compared to the others.

Table 4: Rework concepts to standardize in the Company

Rework Concepts	Warehouse	Purchasing	Eng.	Exp.	AI	MI	PPC	Qual.	Total	%
Redo something that was done incorrectly for the first time	1	0	2	0	3	26	1	1	34	48
Action to correct changes, errors, omissions or damage	3	3	0	0	1	14	1	1	23	32
Correct imperfections (out the quality specifications)	0	1	1	0	2	3	0	1	8	11
Work to be redone for not meeting the requirements	0	0	0	2	1	3	0	0	6	8
Total →	4	4	3	2	7	46	2	3	71	100

Source: Author (2020)

4.3 Problem identification

To identify the sector with the greatest number of problems, it was asked "which major problem has had a strong impact on the company's costs?". As a result, all 71 responded, generating a total of 41 problems, of which, these 39 problems were validated and organized in descending order:

Wrong component feeding (7; 10.4%), damaged bosa (7; 10.4%), missing components (5; 7.5%), broken led (4; 6%), tall components, damaged components, blurred label, failed tests, lack of engineering maintenance, lack of trained labor, insufficient welding, duplicated MAC and design change each appears with two votes (3%) of the respondents.

Finally, each of the following problems was mentioned only once (1.4%): stained bosa, an employee in training, standing component (tombstone), displaced components, foreign body, old equipment, recording error in the IC, design error sent by Supplier, label with wrong information, false failure, process failures, lack of daily maintenance of the welding machine, incorrect planning or customer information, displaced LEDs, non-standard SMD materials, poor quality material, change in firmware, not following the IGTs of the processes, production order with wrong structure, a plate with graphite problem, damaged

plates, finished product rejects, retests, RMA, testing and exchange of labels and components.

4.4 Identification of sectors, classification, causes and prioritization of problems

Other questions were asked to identify the sectors that detect the problems, their origin, their classification, the root causes, as well as to verify the impact, the ease of elimination, the level of investment required, and the tendency of a resurgence, to try to prioritize the problems by the SCORE matrix.

The questions were:

3a "What sector do you work in?"

3b "What is the number one problem that has generated the reoccurrence of rework with a strong impact on costs in the short term?"

3c "Which category would you rate the Problem in?"

3d "What root cause is contributing to the problem?"

3e "If nothing is done to face the problem, what negative impact on the Sector's Image (Seriousness = S)"

3f "How Easy is it to eliminate or reduce the problem (Resolution)"

3g "If a budget was released to face the problem, what is the level of investment needed (Very high budget = 1; Medium = 3; Low = 5)

3h "If nothing is done, what is the tendency of the Problem to reappear over time (Evolution takes time to appear = 1; to appear in up to 1 month = 3; to appear soon = 5"

3i Usually the problem has origin in which sector? ".

Regarding the SCORE Matrix, it was developed by Silva (2018) to prioritize each problem using a Likert scale from 1 to 5 (Seriousness, Cost, Budget-Orçamento, Resolution, and Evolution), the product of these values generates the SCORE of the problem, allowing its sorting in the order of priority. And Chart 1 presents the profile of the 39 problems in order of SCORE prioritization, and the five considered as priorities are:

First) IC recording error (2500 points), with the root cause being the failure to comply with the procedure; second) tall components (2025 points), the root causes are lack of skill or misalignment of the welding machine; third) lack of engineering maintenance (2025 points), root causes are test failures or inefficient maintenance management; fourth) production order with wrong structure (1600 points), the root cause is system structure not updated according to BOM; fifth) blurred label (1280 dots), the root cause is an oscillation in the printer.

Problems	**Detected**	**Origin**	**Classification**	**Root causes**	**SCORE**
IC recording error	Warehouse	Other	Change	Non-compliance with the procedure	2500
Tall components	MI	MI and other	Error or Omission	Lack of skill or mishandling of the welding machine	2025
Lack of engineering maintenance	MI	MI	Omission	Testing failures or inefficient maintenance management	2025

Production order with wrong structure	PPC	PPC	Omission	System structure not updated according to BOM	1600
Blurred label	AI and MI	Warehouse	Error and Omission	Oscillating printer	1280
Employee in training	MI	MI	Omission	Lack of skill	1200
Damaged components	MI	MI	Error	Incorrect handling	1200
Lack of trained labor	MI	MI	Error or Omission	Lack of follow-up	1139
Incorrect planning or customer information	EXP	Other	Change	Change in what was initially agreed or change in customer demand	1125
Low quality material	PURCHASING	Other	Damage	New supplier failure	1125
Graphite problem board	Quality	Other	Error	The temperature of the welding machine is incompatible. The plate was not developed for welding by the machine, but manual	1125
Tests failed	MI	MI and Other	Error or Omission	Lack of testing maintenance	1050
Offset components	IM	IM	Change	Inadequate maintenance on the welding machine	1000
Label with wrong information	ENG	Other	Omission	Communication failure	1000
Non-standard SMD materials ex: out of tape	Warehouse	Oher	Error	Supplier sends material out of specifications	1000
Damaged plates	MI	MI	Error	Change in production cycle time	960
Insufficient welding	MI	AI	Change	Non-compliance with the procedure	945
Strange body	MI	MI	Error	Non-compliance with the procedure	800
Failure to follow the IGT's of the processes	Quality	Other	Error	Indiscipline	800

Continuation of Chart 1.

Problems	Detected	Origin	Classification	Root causes	SCORE
Firmware change	ENG	Other	Omission	Failed to implement the new product version	750
Finished product waste	Purchasing	MI	Error	Inattention	750
Missing components	MI	AI, MI and other	Error, Change or Omission	Inattention	657
Duplicate Mac	Warehouse. (Exp)	MI and Exp	Error	Labeling and reading error	608
Process failures	Quality	Other	Error	Lack of information for the employee and insufficient training.	540
Broken led	MI	AI and MI	Damage, Error or Change	Non-compliance with the procedure	482
Wrong component feeding	AI and MI	Warehouse, AI and Other	Error, Change or Omission	Inattention	456
False failure	MI	Other	Error	Lack of maintenance during the tests	450
Offset LEDs	MI	AI	Change	Misfit machine	450
Damaged bosa	MI	MI, Quality and Other	Damage, Error or Change	Damaged bosa	445
Changing in the Project	Purchasing and MI	PPC and other	Change	Engineering does not act effectively	391
Label and component exchange	PPC	Other	Error	Labels with internal validation problems out of date, supplier error component wrong indication	300
Standing component (Tombstone)	AI	AI	Error	Oven profile failure	200
Lack of daily maintenance of the welding machine	MI	PPC	Change	Inefficient maintenance management	180
Spotted bosa	MI	other	Change	Non-compliance with the procedure	150
Old equipments	ENG	PPC	Error	Demotivation or Devaluation	120
Design error sent by the Supplier.	Purchasing	Other	Error	Wrong Product Development.	75

Problems	Detected	Origin	Classification	Root causes	SCORE
Retests	MI	MI	Error	Insufficient soldering on the plates	60
Test	MI	MI	Omission	System error	30
RMA	Warehouse	MI	Damage	Inattention	25

Chart 1: Profile of problems that generate rework in the processes of digital routers

Source: Author (2020)

The sector where most problems were detected is Manual Insertion (63%), followed by Automatic Insertion (10%), Warehouse (6%), Purchasing (6%), Engineering (4%), Quality (4%), PPC (3%) and Expedition (3%). The sector that causes problems are: Manual Insertion (37%), followed by Automatic Insertion (16%), Other (16%), Supplier (9%), PPC (6%), Warehouse (6%), Client (4 %), Expedition (3%) and Quality (1%).

Regarding the question "3.c What root cause is contributing to the problem?" about 35 potential root causes have been identified, of which the most frequently cited are non-compliance with the procedure (mentioned eight times out of 50; 16%), inattention (mentioned five times out of 50; 10%), lack of components (appear two times; 4%), lack of skill (mentioned two times; 4%), lack of maintenance in the tests (mentioned two times; 4%), inadequate maintenance on the machine (mentioned two times; 4%), etc.

Regarding the classification of problems, most were considered Error (44%), followed by Change (24%), Omission (20%), and Damage (12%).

4.5 Serious consequences for the organization and partners

To identify the consequences of the problems generating rework in the organization or the partners, the following question was asked, containing six options: 3i) In addition to the cost, the selected problem has generated more consequences in which category? a) Employees; b) In the Material; c) In Time; d) In the Management of Directors; e) Relationship with Suppliers; f) In the Relationship with Internal Customers; g) I don't know. As a result, 18 (25.4%) employees stated that they did not know how to answer, 53 (74.6%) pointed out that external Customers (58%, 5), Time (13.2%), Material (9.4 %), and Employees (7.5%) are the categories most affected, as shown in Table 5.

Table 5: Categories most affected by the problems that generate rework

Affected categories	Total	%
Relation with External Customers	31	58,5
Time	7	13,2
No Material	5	9,4
Employees (HR)	4	7,5
Management of Administrators	3	5,7
Relationship with Suppliers	3	5,7
Total →	53	100

Souce: Author (2020)

4.6 Serious effects on Employees

The analysis of this section involves questioning the effect of the problem on employees, and these eight options were presented: Absenteeism (lack of employees); b) Conflicts between sectors; c) Fatigue (tiredness); d) Demotivation; e) Stress; f) Dissatisfaction; g) Fear of being fired; h) It worsens the professional image of those involved.

The majority (69; 97.18%) answered the question correctly and the results show that rework affects employees with: 1st) demotivation (21; 29.6%); 2nd) absenteeism (10; 14.1%); 3rd) conflicts between sectors (9; 12.7%); 4th) stress (9; 12.7%); 5th) the worsening of the professional image of those involved (7; 9.9%); 6th) dissatisfaction (6; 8.4%); 7th) the fear of being fired (5; 7.0%); 8th) fatigue (4; 5.6%).

4.7 Consequences on the Categories, and Employees

The Table 6 shows the consequencies of the problems that generated rework on the categories, as well as on employees.

In short, the result showed that:

Table 6: Problems that generated rework and affect the categories and employees

PROBLEMA NÚMERO 1	Total	CONSEQUENCIAS SOBRE AS CATEGORIAS						EFEITOS SOBRE OS COLABORADORES							
		Adm.	Clientes	Fornec.	Material	Tempo	RH	Abs.	Conf.Set.	Desm.	Estresse	Fadiga	Ins.	MedoDesp	ImagProf.
Led Quebrado →	4	.	4	.	.	.	.	1	.	2	.	.	.	.	1
Componentes Faltando →	4	1	3	.	.	.	.	1	.	2	2	.	.	.	.
Alimentação errada do componente →	4	.	1	1	2	.	.	.	.	1	.	1	.	3	2
Bosa Danificada →	2	.	2	.	.	.	.	2	.	2	1	1	1	.	.
Falta de Mão de Obra Treinada →	2	.	1	1	.	.	.	.	.	1	.	.	1	.	.
Mac Duplicado →	2	.	1	.	.	1	.	.	1	.	.	.	1	.	.
Etiqueta Borrada →	2	.	1	.	.	.	1	1	.	.	.	.	1	.	.
Mudança de Projeto →	2	.	2	.	.	.	.	.	.	1	1	.	.	.	.
Componentes Danificados →	2	.	2	.	.	.	.	.	.	2	.	.	.	.	.
Falta de Manutenção de Engenharia →	1	.	1	.	.	.	.	.	.	.	.	.	.	1	1
Rejeito De Produto Acabado →	1	.	1	.	.	.	.	.	.	.	.	.	.	.	1
Erro de Gravação do IC →	1	.	1	.	.	.	.	.	.	.	.	.	.	1	.
Inf. Incorreta/Incompleta do Plan/Clientes →	1	.	.	.	.	1	.	.	.	.	.	1	.	.	.
Mudança de Firmware →	1	.	1	.	.	.	.	.	.	.	.	1	.	.	.
Não Seguimento das IGT's dos Processos →	1	.	.	.	.	1	.	.	.	.	1	.	.	.	.
Material Com Baixa Qualidade →	1	.	.	.	1	.	.	.	.	.	1	.	.	.	.
RMA →	1	.	.	.	1	.	.	.	.	.	1	.	.	.	.
Falha Falsa →	1	.	1	.	.	.	.	.	.	.	1	.	.	.	.
Outros problemas citados →	18	.	8	.	1	4	.	5	8	10	1	.	.	.	2
Sub total →	**51**	**3**	30	**2**	**5**	**7**	**4**	**10**	**9**	**21**	**9**	**4**	**4**	**5**	**7**
% →	**100**	**5,9%**	**58,8%**	**3,9%**	**9,8%**	**13,7%**	**7,8%**	**14,5%**	**13,0%**	**30,4%**	**13,0%**	**5,8%**	**5,8%**	**7,2%**	**10,1%**

Source: Author (2020)

First) the relationship with External Customers (yellow column) is the category most affected and the main problems that generate rework and seriously affect this category are: broken led (Led Quebrado = 4; 13%), missing components (Componentes Faltando = 3; 9.7%), wrong component feeding (Alimentação errada do componente = 2; 6.5%), damaged bosa (Bosa danificada = 2; 6.5%), project changing (Mudança de Projeto = 2; 6.5%), defected components (Componentes danificados = 2; 6.5%), lack of trained labor (Falta de mão de obra treinada), duplicate Mac (MAC duplicado), lack of engineering maintenance (Falta de manutenção de Engenharia), finished product rejected (Rejeito do produto acabado), recording error in the IC (Erro de gravação do IC), each with a vote (3.2%).

Second) concerning the effects of rework on employees, demotivation (pink column) was highlighted, due to: damaged bosa (Bosa danificada = 2; 9.5%), damaged components (Componentes danificados = 2;

9.5%), components missing (Componentes faltando = 2; 9.5%), broken led (Led quebrado = 2; 9.5%), wrong component feeding, stained bosa, tall components, label with wrong information, failures in tests, lack of trained labor, change of design, production order with wrong structure, a plate with graphite problem, damaged plates and tests, each with an answer (4.8%).

4.8 Proposed conceptual model to classify and reduce rework

When analyzing the models identified in the theoretical framework, as well as the results obtained in the company's sectors, a conceptual model was proposed for top management to reflect, adapt and use, as shown in Figure 8.

The conceptual model is based on 5 stages of the Organizational Learning Cycle PECAV (Plan, Execute, Check, Act and Value), an improved variation of the old PDCA Cycle (Plan, Do, Check, and Action).

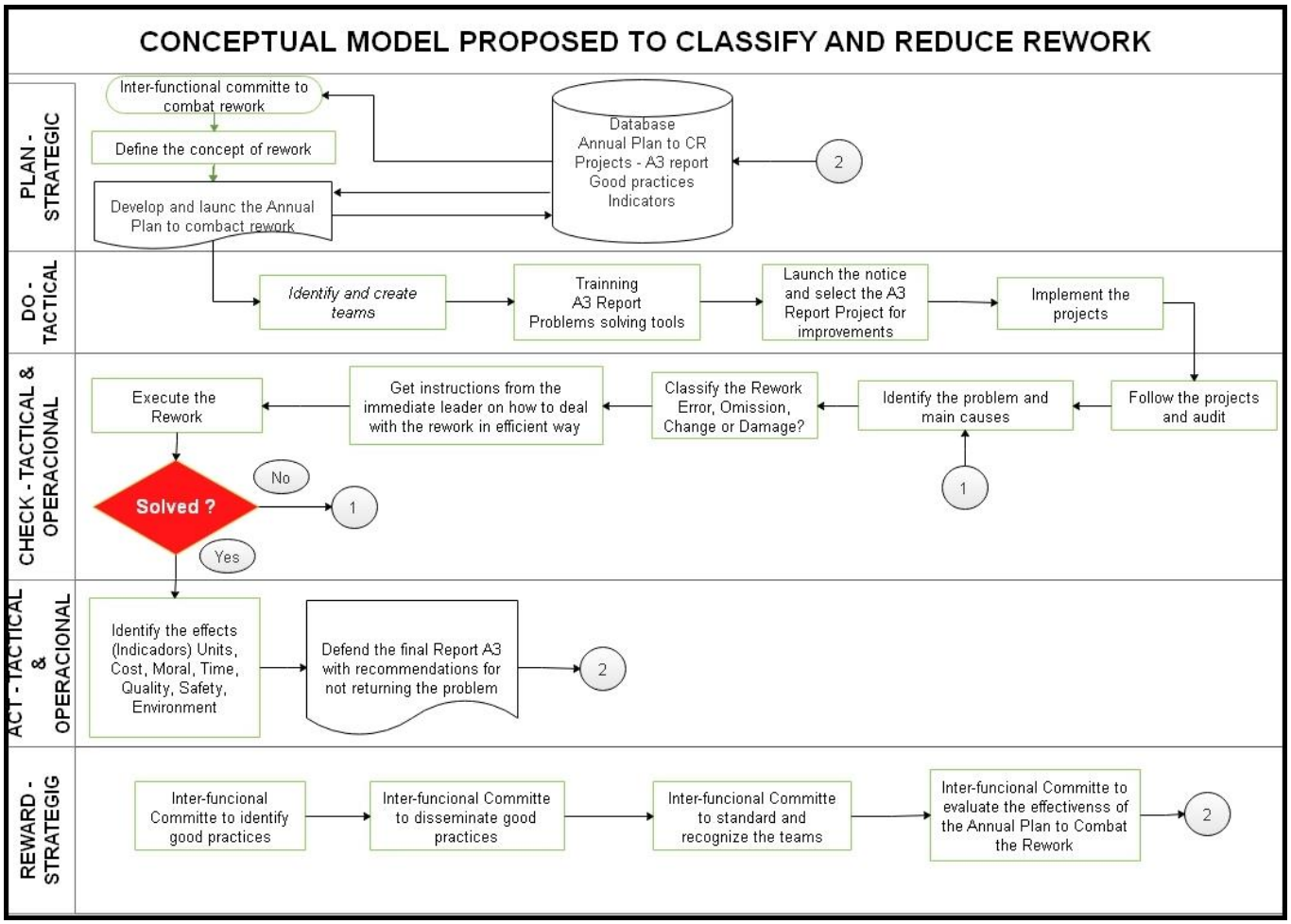

Figure 8: Conceptual model proposed to classify and reduce rework

Source: Author (2020)

Rework is a non-conformity linked to quality. There must be a political decision, determined by the top management of the organization (DEMING, 2000). The model is for managers, with the following recommendations:

Step 1) Plan (Strategic Level)

1) Analyze this article, its results, and the proposed model;

2) If the model is useful (adapted to the reality of the organization), incorporate it into the company's strategic planning;

3) Create an interdisciplinary committee, composed of representatives from each sector that was studied; define assignments for the commission, some of which are: define the concept of rework; study the article; prioritize the problems that were identified in the research; prepare, approve, launch, monitor and evaluate the Annual Plan to Combat Rework (PACR);

4) Allocate resources to the PACR;

5) Support the improvement of a robust database containing information about the PACR, improvement projects, indicators;

Step 2) Execute (Tactical Level) in partnership with the managers of the sectors involved

6) Identify and form teams;

7) Conduct training for team members to improve skills to identify and solve problems that generate rework. Seventy-one employees answered if they were interested in participating in this type of training, the majority (60; 84.5%) reported that yes, nine (12.7%) responded negatively, while two (2.8%) did not respond. Table 7 shows the respondents' interest in the techniques offered.

Table 7: Techniques or Tools that 60 respondents would like to receive training

SECTOR	Objectives and Challenges Trees	Decisory Star	Rich Picture	Vertical Flowchart	MASP	SCORE Matrix	PDCA	A3 Report
Warehouse	1	1	1	1	2	1	1	2
Purchasing	0	2	0	0	0	0	1	0
Engineering	0	0	0	0	1	0	1	0
Expedition	1	1	1	1	2	1	1	1
AI	0	2	0	1	1	1	2	1
MI	20	18	13	15	12	17	14	12
PPC	1	2	1	1	1	1	1	1
Quality	0	0	0	0	1	1	1	0
Subtotal →	23	26	16	19	20	22	22	17
% →	38,3	43,3	26,7	31,7	33,3	36,7	36.7	28,3

Source: Author (2020)

According to the results in Table 7, some of the techniques/tools that aroused interest in employees are Decisory Star (43.3%), Objectives and Challenges Trees (38.3%), PDCA (36.7%), SCORE Matrix (36.7%), MASP (33.3%), Vertical Flowchart (31.7%), A3 Report (28.3%) and Rich Picture (26.7%).

8) Launch a public notice and select proposals for development projects to reduce rework, using the A3 Report model in conjunction with other techniques/tools;

9) The teams execute the projects;

Step 3) Check (Tactical and Operational Levels)

10) Create or mobilize an audit team to monitor and support the development of projects, involving

the correct identification of the problem, analysis of the root causes, classification of rework, obtaining guidance from the immediate leadership, execution of Rework, analysis of the rework resolution and corrective actions, if necessary, return to the first actions;

Step 4) Act (Tactical and Operational Levels)

11) Identify the Effects (Indicators) of Rework

12) Prepare and defend the Final Report A3, containing proactive recommendations to avoid reoccurrence of rework;

13) To constantly supply the Database with all the key information of the project involving rework;

Stage 5) Valuing (Strategic Level) involving the Interdisciplinary Committee

14) Identify good practices;

15) Support the dissemination of Good Practices;

16) Standardize Good Practices with the Database;

17) Recognize the teams;

18) Assess the effectiveness of the PACR with recommendations for the next annual plan;

19) Update the Database.

5. Conclusions and recommendations

The general objective of the research is to contribute for the improvement of the classification and the reduction of rework in the sectors involved with the production of digital routers from EX da Amazônia.

After studying a theoretical framework on rework, involving five identified models, as well as applying a questionnaire to 71 company employees, the data analysis allows us to conclude that:

a) rework is a challenge faced in several countries, and a good part of the research identified in articles was carried out in the civil construction industry, all five models identified came from this economic branch, which is why it is recommended to approach the academy for expansion of research in other types of companies, especially those with more expressive participation at the Manaus Industrial Pole, such as electronic electronics, computer goods, two wheels, thermoplastic, metallurgical, mechanical and others;

b) Rework is a non-conformity linked to quality, to face it, there must be a political decision, determined and supported by the top management of the organization (DEMING, 2000), because of this, the best model to classify and reduce reworks of EX da Amazônia, must be developed by senior management, based on an interdepartmental approach, with diagnoses of the situation in each department, as well as the adoption of an annual plan to combat rework, supported by the adoption of information and communication technologies, awareness, continuous training, quality tools, approaches for improvement projects, audits, standardization, identification and dissemination of good practices, and recognition of employees;

c) “Redo something that was done incorrectly the first time” and “Action to correct changes, errors, omissions or damages” are the concepts of rework most chosen by employees in the investigated sectors, being recommended for managers, to standardize and disseminate to employees, external customers, and suppliers;

d) rework brings more serious consequences on the Relationship with Clients, Time, Material and HR,

with the most effects on employees being: 1st) demotivation; 2nd) absenteeism; 3rd) conflicts between sectors; 4th) stress; 5) and worsening the professional image of those involved. In general, it can be seen that External and Internal Customers are strongly affected by the effects of rework, worsening the image of the organization over time, reason by which the implementation of an annual plan, implemented in partnership with the employees and partners can help to systematically reduce problems, as well as to start a proactive culture to prevent such problems from recurring;

e) the proposed conceptual model can be incorporated into the strategic planning of the organization, has five phases, with 19 recommendations that can be improved with the existing expertise, accompanied by strong training of employees, with the following techniques/tools being recommended: Decisorial Star, Trees Objectives and Challenges, PDCA, SCORE Matrix, MASP, Vertical Flowchart, A3 Report, and Rich Picture. New research can be done to assess the necessary budget, as well as the impact of the implementation of this model on the organization.

6. Acknowledgments

Thank Company EX for the opportunity to conduct the research. To Doctors Marly Guimarães Fernandes Costa and Dalton Chaves Vilela Júnior, for coordinating the Postgraduate course in Engineering and Industrial Management;

Thank the supervisor, Prof. Dr. Jonas Gomes da Silva, for the support, encouragement, and corrections;

Thank Company EX da Amazônia for the opportunity to conduct the research;

Thank Doctors Armando Araújo de Souza Júnior and Ocileide Custódio da Silva for the recommendations for improvements during the defense of the article on the board held in August 2020.

Finally, as provided for in Article 48 of Decree No. 6,008/2006, this work was financed by Flex Industries, under the terms of Federal Law No. 8,387/1991, within the scope of the Priority Project for Human Resources - CAPDA/SUFRAMA, coordinated by the Muraki Foundation and executed by the CETELI of the Federal University of Amazonas - UFAM.

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