Participative approach to graduate students evaluate FT/UFAM Services

Dr. Jonas Gomes da Silva (jgsilva@ufam.edu.br)

Federal University of Amazon (UFAM) - Faculty of Technology

Department of Industrial Engineering - EUREKA Laboratory

Manaus – Amazon – Brazil

Abstract

It has a participatory approach to continuously evaluate the level of satisfaction of Industrial Engineering students with the main services provided at the Faculty of Technology of the Federal University of Amazonas (FT/UFAM). To this end, studies were conducted to learn about existing services at the Faculty and to identify methodologies to assess customer satisfaction, resulting in the creation of a seven-step methodology that allowed veteran students of the Quality Management discipline to develop a questionnaire model with seven requirements and forty-nine items, which was applied to 122 students of the Industrial Engineering Course in June 2010. After the analysis of the results, conclusions and recommendations were generated, among them, it can be stated that the methodology and its data collection model can serve as evaluation tools to contribute to the process of continuous improvement of the services provided at FT/UFAM. Moreover, the methodology proved to be efficient in its application and also to motivate the students, once they felt valued and could understand the importance of participative management in the planning of any organization.

Keywords: Evaluation; Methodology; Model; Participation; Requirement; Items;

1. Introduction

The research was conducted in 2010 at the Federal University of Amazonas (UFAM), located in the city of Manaus, capital of Amazonas, Brazil. At that time, the University had completed 102 years of existence with the mission of "Cultivating knowledge in all areas of knowledge through teaching, research, and extension, contributing to the formation of citizens and the development of the Amazon."

According to its strategic planning, its vision was: (a) to be recognized for the excellence achieved in public education, scientific production and contribution to social development; (b) have qualified, valued and committed functionary with the Mission; (c) have adequate infrastructure to reach the mission; (d) have effective management supported by information from administrative, academic and technical processes.

To achieve the mission and vision proposed above, UFAM had 14 units in Manaus and 5 units in the municipalities of Benjamin Constant, Coari, Humaitá, Itacoatiara and Parintins, which offered about 96 undergraduate courses for 20,000 students and 39 postgraduate courses for 2000 "stricto sensu" students certified by Capes. Among these units, there is the Faculty of Technology (FT), composed in 2010 by five departments (Department of Design and Graphic Expression; Construction; Electronics and Telecommunications; Electricity; Hydraulics and Sanitation; Geotechnics and Transportation), which in

second semester of 2010 offered 10 undergraduate courses for 1429 undergraduates, as demonstrated bellow:

Course 1) Architecture and Urbanism = 129 students

Course 2) Design and Graphic Expression = 148 students;

Course 3) Civil Engineering = 245 students;

Course 4) Computer Engineering = 205 students;

Course 5) Gas and Oil Engineering = 49 students;

Course 6) Electrical Engineering = 217 students;

Course 7) Materials Engineering = 78 students;

Course 8) Mechanical Engineering = 87 students;

Course 9) Industrial Engineering = 223 students;

Course 10) Chemical Engineering = 48 students).

Over the years, considerable investments were made to expand FT's infrastructure, but a low investment to systematically improve the management of services provided at FT, among them: the Direction Management; Course coordination; the restaurant; the library; Graphic Services; Teachers' Services, etc.

The problem with the research is that even with 52 years of existence, there is no model in this unit to continuously evaluate the services provided, from the perspective of most of its users, undergraduate students. Thus, the main question of this research is "How to develop a participatory methodology for undergraduate students to continuously evaluate the services provided at FT/UFAM?"

Given the above, the general objective of the research is to develop, in a participatory way, a methodology to continuously evaluate the level of satisfaction of students of the Industrial Engineering course with the main services provided at FT/UFAM.

To this end, the following specific objectives were set: (a) To identify the best way to build a participatory approach from the students' perspective; (b) test the approach and its data collection and analysis model to identify key points for improvement; (c) Propose a procedure to improve FT/UFAM's methodology and key services.

The creation of a participatory methodology to systematically evaluate service performance is relevant:

a) as it helps to know which requirements and items students consider relevant to be evaluated for the faculty to be considered excellent in providing their services;

b) contribute to the development of a culture focused on continuous improvement in FT/UFAM;

c) contributes to achieving UFAM's mission and vision over time;

d) help in academic reflection on the subject to generate criticism and new research;

e) may be used as a case study in classrooms;

f) may be a benchmark for other UFAM units;

g) may serve as a guide for FT/UFAM managers to improve their management over time.

2. Theoretical Referential

To accomplish UFAM's mission and vision, academic unit managers need to diagnose the reality to improve objectives, goals, action plans and indicators to measure how excellent each service offered at their units is.

According to Albrecht (1993), something is measured so that it can be done better because of the knowledge gained from a measurement. For quality improvement, it is needed to identify opportunities, establish a basis or verify the implemented actions.

According to Whiteley (1996), these are the five principles to follow to measure customer satisfaction:

a) know measuring reason;

b) let customers tell which results to measure;

c) constantly ask about the performance and of the competitors;

d) follow up on the internal procedures that should produce the results the clients want as well as the final results;

e) inform staff of all discoveries.

According to Harrington (1993), measurements are the starting point for improvement because it allows to set and track goals. Measurements are critical since if it cannot measure the process, nothing can control it, no one cannot manage it or improve it because the decision-making process is compromised.

For Albecht (1993) there is no "right" way to measure all aspects of quality. A range of measurement strategies is required depending on how the customer defines each aspect.

Denton (1990) says that the key to any assessment is to understand what one wants to measure and then act upon the results. Each organization or administrator who wants to improve services needs to decide how many and what measurement to use.

According to Neely et al. (1995) apud Corrêa (2009), performance measurement can be understood as the technique used to quantify the efficiency and effectiveness of business activities. Efficiency will discuss the use of resources without waste, the relationship between economic use of resources, taking into account a certain level of satisfaction. In turn, effectiveness evaluates the achievement of the goal, the result of a process where the expectations of various customers are met or not.

Rezende (2003) adds that a performance measurement system not only provides data necessary for management to control the various activities of organizations but also impacts decisions and organizational behavior.

A balanced measurement is as a dialectical process that leads to the continual discovery of focuses and sources of improvement in the organization's set of intangible assets, rather than a simple comparison of predictions and achievements over a period (adapted from CARVALHO et al., 2005).

There are several studies focused on organizational performance indicators, such as Van Bellen (2002), Fernandes (2005), Merchant (2006), Machado, Machado and Holanda (2007), Callado, Callado and Almeida (2008), etc.

A broad study of the characteristics of performance indicators used in surveys conducted in the fields of Administration, Accounting and Tourism from 2000 to 2008 revealed 24 terminologies (page 381) used involving performance indicators (Chart 1) as well as 21 concepts (page 382) extracted from the authors

researched by Nascimento et al. (2011).

For this research, the indicators are considered flags that seek to express and demonstrate the reality in a way that is possible to observe and obtain more concrete data to improve the evaluation (COELHO, 2004), are considered supportive tools to evaluate processes (FREIRE; CHRISÓSOME; CASTRO, 2007) and performance indicators are qualitative or quantitative elements used to detail the extent to which the objectives or goals were achieved, observing the deadline and the resources used.

Also, to create a good system of performance indicators, it needs to know some types of measurement, there is the measurement of individual performance in which, based on criteria defined by Human Resources, measure employee performance. Besides, there is also the measurement of processes, products, departments, systems and organizations, the last being of most interest for this research, by valuing the perception of those who use the services, the customers.

Several authors in the literature have sought to develop models for assessing customer satisfaction (ENGEL and KOLLAT, 1968; HOWARD, 1974; DAY, 1977; LATOUR and PEAT, 1979; OLANDER, 1977; OLIVER 1977, OLIVER, 1980, GRONROOS, 1984, PARASURAMAN et al., 1985, CRONIN and TAYLOR, 1992; BARROS, 2013, etc.), and far from wanting to debate the controversial points of each model, the approach to measuring the most interesting satisfaction for this research was that adopted by Cronin and Taylor (1993), focused on assessing customer perceptions based on the analysis of the quality of services received. They created a model called SERVPERF with 5 dimensions and 22 items applied to ascertain through a Likert scale, the real performance of the service organization.

In summary, Miguel and Salomi (2004) reviewed the main models for measuring quality in services and concluded that there is no consensus in the literature on the most appropriate model to measure it from the clients' point of view.

Chart 1 –

Artigo Investigado	Definição Apresentada	Autores em que é Apoiada a Definição Apresentada
Duran e Batocchio (2003)	As medidas de desempenho devem direcionar os esforços de melhoria contínua e cumprir uma série de requisitos. Hudson *et al.* (2001), baseando-se numa exaustiva revisão na literatura feita por Neely *et al.* (1997), listaram características que todo sistema de medição de desempenho deveria possuir: estar diretamente relacionados com a estratégia da empresa; claramente definidos e com um propósito específico; ser relevantes e fáceis de manter.	Hudson *et al.* (2001) e Neely *at al.* (1997) (*apud* DURAN e BATOCCHIO, 2003)
Machado Júnior e Rotondaro (2003)	Para Takashina e Flores (1996), são formas de representar numericamente características de produtos e processos. Para Muscat e Fleury (1993), indicadores de desempenho de qualidade são mecanismos que apontam se a organização está sendo competitiva em relação às demandas de seus clientes. Na visão desses autores, os indicadores da qualidade devem orientar a melhoria do desempenho operacional e competitivo.	Takashina e Flores (1996) e Muscat e Fleury (1993) (*apud* MACHADO JÚNIOR e ROTONDARO, 2003, p.1)
Siqueira, Rosa e Oliveira (2003)	O conjunto de indicadores de desempenho permite, por meio de medições previamente estipuladas, concluir ou questionar como está o desempenho da empresa. A implantação desses indicadores é de suma importância para que as empresas perpetuem suas atividades no mercado, propiciando um gerenciamento mais realista de seus recursos.	Definição dos autores
Coelho (2004)	Indicadores são parâmetros qualificados e/ou quantificados que servem para detalhar em que medida os objetivos de um projeto foram alcançados, dentro de um prazo delimitado de tempo e numa localidade específica. Os indicadores são marcas ou sinalizadores que buscam expressar e demonstrar a realidade sob uma forma que seja possível observar e obter dados mais concretos para melhorar a avaliação.	Valarelli (1999, *apud* COELHO, 2004, p.434)
Sá, Claro e Caixeta Filho (2004)	Indicadores de desempenho são características de processos operacionais que comparam a eficiência e/ou a efetividade da cadeia estudada com cadeias-alvo ou com cadeias-modelo. Os indicadores são usados para medir características da cadeia em questão, tais como: grau de utilização, produtividade, tempo e prazos de entrega, disponibilidade e condições de qualidade dos produtos ofertados, entre outros.	Van der Vorst (2000, *apud* SÁ, CLARO e CAIXETA FILHO, 2004, p.41)

Some definitions found about performance indicators

Source: Nascimento et. Al. (2011 p. 382)

Another interesting approach to measuring organizational performance that differs from the above is called 10M, used to verify the strengths and weaknesses of an organization, proposed by Costa (2007 p. 115), as shown in Figure 1.
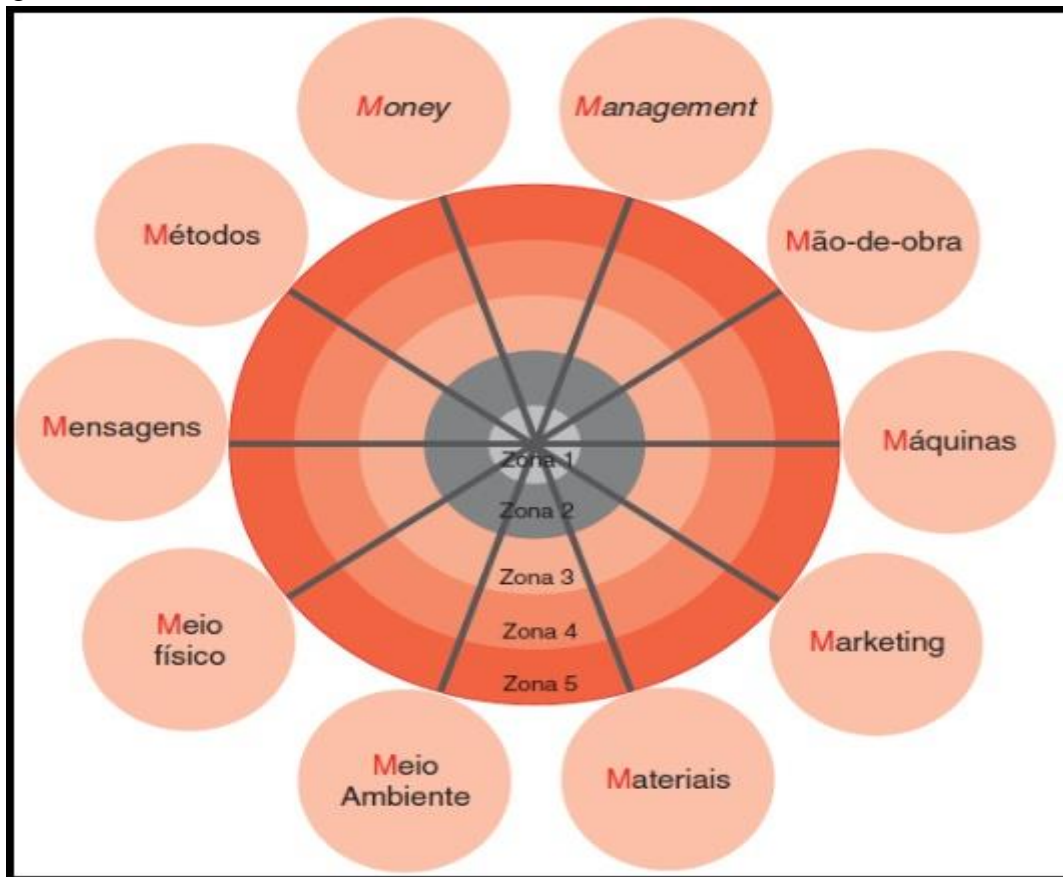

Figure 1 – 10M s of self-diagnosis proposed by Costa (2007 p.119)

For Costa (2007), organizational analysis is structured into ten areas categorized by the letter M, which cover the relevant internal points of any organization: Management, Manpower, Machines, Marketing, Materials, Environment, Infrastructure, Message, Methods, and Money.

According to Costa (2007), the points to be evaluated should be classified in these ten categories and if there are points that are difficult to classify, they should always be placed in Management, since any relevant internal matters of the institution that has no clear allocation, it is ultimately, the responsibility of management.

For Costa (2007 page 116), in each of the 10Ms (categories that will now be called requirements), some items to be analyzed can be constructed, as illustrated by Chart 2.

Although Costa (2007 p. 118) presents the proposal for an Institution radar chart with a scale of 1 to 5 represented by Zones (Figure 1), it is recommended that the team who is planning the assessment, choose the number of requirements and items, as well as the choice of scale to use, as it depends on the resources available to develop internal organizational analysis.

Another point to consider is that the more participative the process of constructing requirements and items, the greater the chance of engaging stakeholders during measurement and organizational improvement.

10 Ms (Requirement)	Items to investigate
Management	Relationship with employees; Relationship with partners and donors; Fundraising Capacity; Project management; Decision-making process; Leadership; Technology Management, etc.
Manpower	Recruitment; Selection; Employee Development; Motivation; Employee and manager satisfaction, etc ...
Machines	Equipment; Machines; Electrical installations; Maintenance of machinery/equipment; Intranet networks, internet, etc.
Message	Internal communication between managers and employees; Bulletin boards; Verbal communication; Provisions and responses to customer complaints; Communication with customers, etc.
Marketing	Market knowledge; Institutional marketing plan; Launch of products or services, Guarantee, and Technical Assistance; Treatment of customer satisfaction; Relationship with the media, etc ...
Materials	Quality of teaching material; Availability of consumables; Availability of permanent material, Supply Chain; Stocks, etc ...
Environment	Energy-saving program; Water saving program; Environmental Awareness of employees, etc ...
Infrastructure	Internal circulation; Parking; Lighting; Cooling; Cleaning; Safety; Visual signage, etc ...
Methods	Process flowchart; Methodology for project management; Methodology for the development of new products or services; Methodology to capture and maintain partners/donors; Standards; Standardization, etc ...
Money	Cash flow; Bills to pay; Bills to receive; Accountability; Financial management; Fundraising plan, etc ...

Chart 2 – Examples of Requisits and Items for internal assessment
Source: Costa (p. 116 and 117)

For Zajac and Bruhn (1999 apud FILHO, 2007, p. 96), participation allows people greater opportunity to have a voice within the organization, to express their opinions on various subjects, whether of self-interest or the organization itself. The authors consider the perception of the opportunity to participate more important than the participation itself.

Silva (2018, p. 54-93) presents several experiences of communities that have developed by valuing participation to obtain good practices of community governance, like in Brazil, the USA, and Japan. The author recommends understanding the concept of community and its functions, as well as the responsibility and tools that can be used to develop participatory diagnostics that can be used with adaptations in business and academic environments.

3. Methodology

The research is applied since UFAM/FT managers will use the knowledge generated. Regarding the objectives, the research is descriptive, since it will use descriptive statistics to present the results without change variable values.

Data were collected and analyzed using a combined (qualitative and quantitative) approach through the case study, bibliographic research, benchmark, brainstorming, panel groups with graduate students during Quality Management subject classes given by the author during the first semester of 2010.

Also, it was used a voting process, part of 10Ms categories and SERVPERF approach, as well as a survey with a questionnaire, applied to graduate students of the Industrial Engineering course of FT/UFAM.

The proposed methodology model has seven steps showed in Figure 2.

Figure 2 – Methodology to graduate students evaluate main services supplied at FT/UFAM

Source: Author

3.1 Step 1 - Identify main services

In 2010, the FT / UFAM was made up of five departments serving about 1,429 undergraduate students and hundreds of postgraduate students. Therefore, the first step was at the beginning of May 2010, to identify the main services provided at FT/UFAM that could be targets of the evaluation.

There were the following services:

a) Sectorial Library of Exact Sciences and Engineering; b) Laboratories and classrooms; c) Services provided by the FT/UFAM Direction, Headship and Course Coordination; d) Restaurant; e) professors; f) support services; g) Reprography.

3.2 Step 2 – Identify the main Methodologies

Between May and June 2010, as part of the planning, was examined a comprehensive literature review (ENGEL and KOLLAT, 1968; HOWARD, 1974; DAY, 1977; LATOUR and PEAT, 1979; OLANDER, 1977; OLIVER 1977, OLIVER, 1980, GRONROOS, 1984, PARASURAMAN et al., 1985, CRONIN and TAYLOR, 1992; BARROS, 2013; COSTA, 2007, etc.) to identify methodologies or methods of organizational performance evaluation, as well as to study the best way to involve students in the construction process. Then it was defined that the best way would be by sampling, choosing FT's Industrial Engineering course and developing the methodology together with a group of more experienced students during the Quality Management course taught by the author that year.

3.3 Step 3 – Plan the Survey instrument model

In June 2010, the survey planning was carried out collectively, observing the following actions:

a) definition of the class of planners: students who helped in the conception and implementation of the model: 21 veteran students of the 9th period of the Industrial Engineering course, since they already have more than 4 years studying at the university and know the services provided at FT/UFAM. The planning took place during the Quality Management classes and their participation was worth applying the knowledge acquired throughout the classes, as well as partial score in the form of a report;

b) definition of the target audience: given the limited time and resources available, it was defined that the target audience would be only the students of the Industrial Engineering course, regardless of the period they were in the course. At the time, there were about 223 students, which represent about 16% of the total students enrolled in FT. So the goal was to interview at least 112 students, which would represent more than half of them;

c) survey planning strategies:

c1) during the classes, the 10Ms methodology was explained as a way to analyze the internal environment of an organization, proposed by Costa (2007), and it was presented to the students, ways on how they could create a participatory methodology to evaluate their work environment;

c2) then, after presenting the main services provided at FT/UFAM, by voting, it was defined that the number of requirements to be evaluated would be seven: Library, Communication, Facilities, Management, Teachers, Restaurant and Pedagogical Methods:

c3) for each requirement, the number of 7 items to be evaluated was defined, totaling 49 items to be considered as standards to evaluate performance;

c4) after defining the Requirements and how many items there would be in each one, then five groups were formed, which received a matrix with the selected requirements and within them seven empty fields for brainstorming to survey what would be the items, which should be measurable to help FT/UFAM be a benchmark for excellence in service delivery;

c5) after the brainstorming and voting sessions, each group presented their proposals generating a total of 67 items, which were systematized on the board to identify the similar (15 common items) and non-common items. Then each group defended their proposals, which went through the process of improvement and voting until all 49 items were consensually chosen, as can be seen in Figure 3;

c6) once the requirements and items were defined, the Likert Scale (1 = Very Dissatisfied; 2 = Dissatisfied; 3 = Fair; 4 = Satisfied and 5 = Very Satisfied) was chosen to measure students' satisfaction with each item set as performance standard;

c7) each group then received copies of the questionnaire (Appendix 1) and guidance for conducting the pilot test, as well as the number of students to interview.

3.4 Step 4 – Perform the Pilot Test

The pilot test was performed with about 20 randomly selected students to simulate the interview, as well as to identify the clarity of the requirements and items of the questionnaire. The definitive test was performed because there was no need to adjust.

3.5 Step 5 – Perform the Definitive Test

Each group of Quality Management students was responsible for interviewing a minimum number of 1st, 3rd, 5th, 7th, and 9th-grade students.

Chart 3 shows the teams, members, periods, minimum number of interviewed, days and times, all for June 2010.

Teams	Member1	Member2	Member3	Member4	Member5	Period	Minimum	Days/Time 1	Days/Time 2
1 (R1 A R23)	Jean	Leonan	José	Ricardo	-	1o	30	3a e 5a/18-19h50	Sábado 8h-11h30
2	Welesson	Luiz	Carlos	Iraldo	-	3o e 5o	24	3a e 5a/18-19h50	2a e 5a/18h-19h50
3	Roberta	Daniele	Sabrina	Cristiano	Jun	3o e 5o	28	3a e 5a/18-19h50	2a e 5a/18h-19h50
4	Marcelo	Samir	Eliane	Jurandy	-	7o e 9o	25 do 7o	2a e 6a/18h-19h50	
5	Josevaldo	Thiago	Rogério	Natasha	-	7o e 9o	20 do 9o	2a e 6a/18h-19h50	

Chart 3 – Distribution of tasks to each team and member to collect data in June 2010

Source: Author

Data collection, verification, and data entry took place from June 13 to 29, 2010. Each team received their planning and entered into a standard spreadsheet, all responses from their survey was entered in a single spreadsheet and then passed to all groups to study and report as part of obtaining partial grades in the Quality Management discipline.

The pilot and final test interviewed 122 students who represented about 55% of all students of the Industrial Engineering course or 8.53% of all students of the courses enrolled in the first semester, 2010.

3.6 Step 6 – Collective analysis and discussion

Between July and August 2010, the groups presented their analysis and suggestions for improvement in the classroom.

They then refined their reports and completed it in August. The partial results of these reports were reported to the Industrial Engineering teachers for their contribution in the following months.

3.7 Step 7 – Dissemination of the Results

Between August and September of the following year (2011), all data were reanalyzed using CALC spreadsheets and descriptive statistics.

Through the Edraw Max Software (version 5), the questionnaire modeling (Figure 3) was completed to assess students' level of satisfaction with the main services offered at FT/UFAM.

To disseminate the results widely, between 7 and 17 October 2011 an article was prepared, which was presented and discussed on 30 November 2011 during a local event, the VI Amazonian Symposium on Industrial Engineering, organized by the Department of Industrial Engineering at FT/UFAM.

Improvement recommendations were incorporated and the model was presented to FT/ UFAM managers, including Course Directors, Heads, and Coordinators, for analysis and administrative arrangements.

Figure 3 – Survey questionnaire model composed by seven Requirements and 49 items.

Source: Author

4. Main Results

The results will focus on step 6 of the Methodology proposed in this research, as the main details of the previous steps were covered in section 3.

Concerning the responses of the 122 students of the FT/UFAM Industrial Engineering course, initially, the general analysis of the results was made observing the average of each requirement (Figure 4) and then observing the performance of the items of each requirement.

4.1 Score of Main Requirements

The main requirements analyzed were: Library, Communication, Infrastructure, Management, Teachers, Restaurant, and Pedagogical Methods.

After analyzing the data (Figure 4), it was observed that only the services offered by the Library (X = 3.01) performed better, however, meaning that a good portion of the respondents considered the services as Regular, as adopted by the Likert Scale.
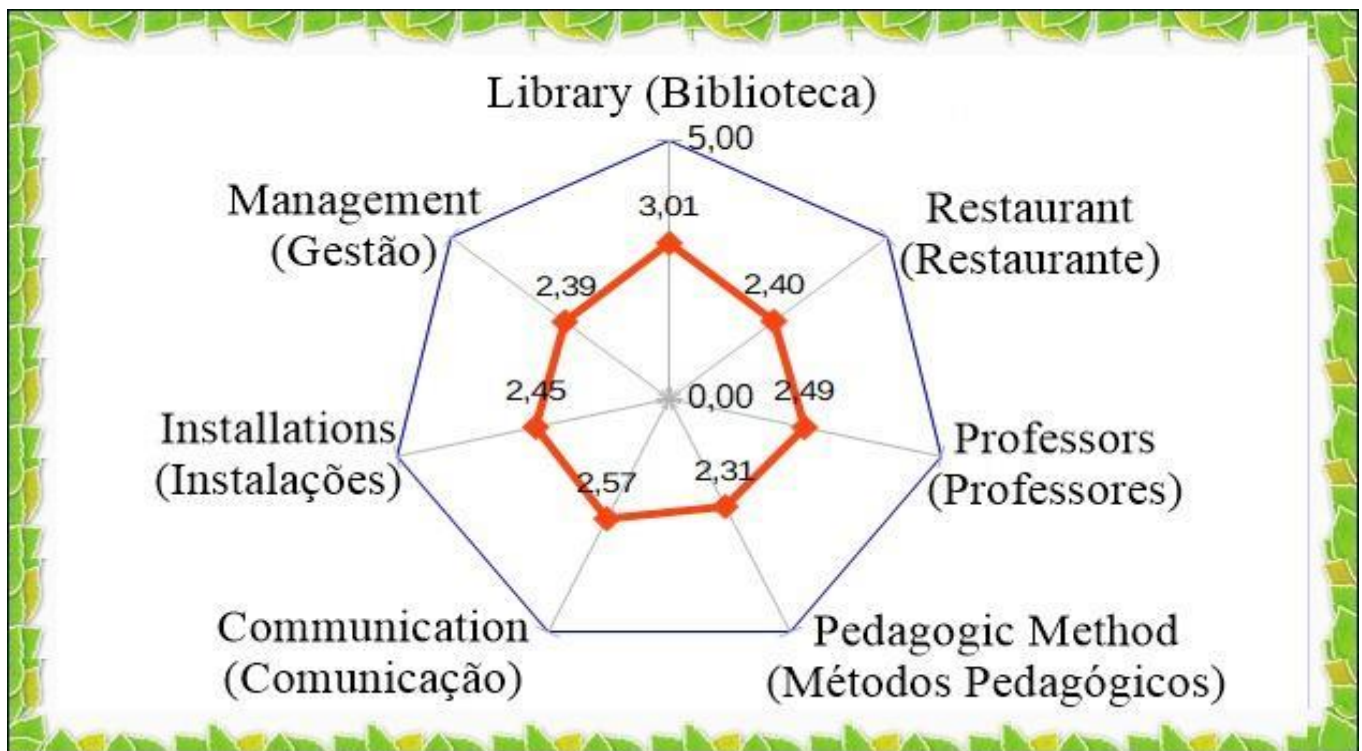
Figure 4 – Average score of the five Requirements
Source: Author

When analyzing responses about Library Requirement, 119 students reported their level of satisfaction. The results of Figure 5 indicate that on average no service was considered Satisfactory or Very Satisfactory. The services considered between Regular and Satisfactory were: Cordiality of Attendance, Speed of Attendance, Hours of Operation, Structure of study space, and Ease to locate books on shelves. On the other hand, the diversification and availability of updated collections are items that urgently need to receive investments from the University.
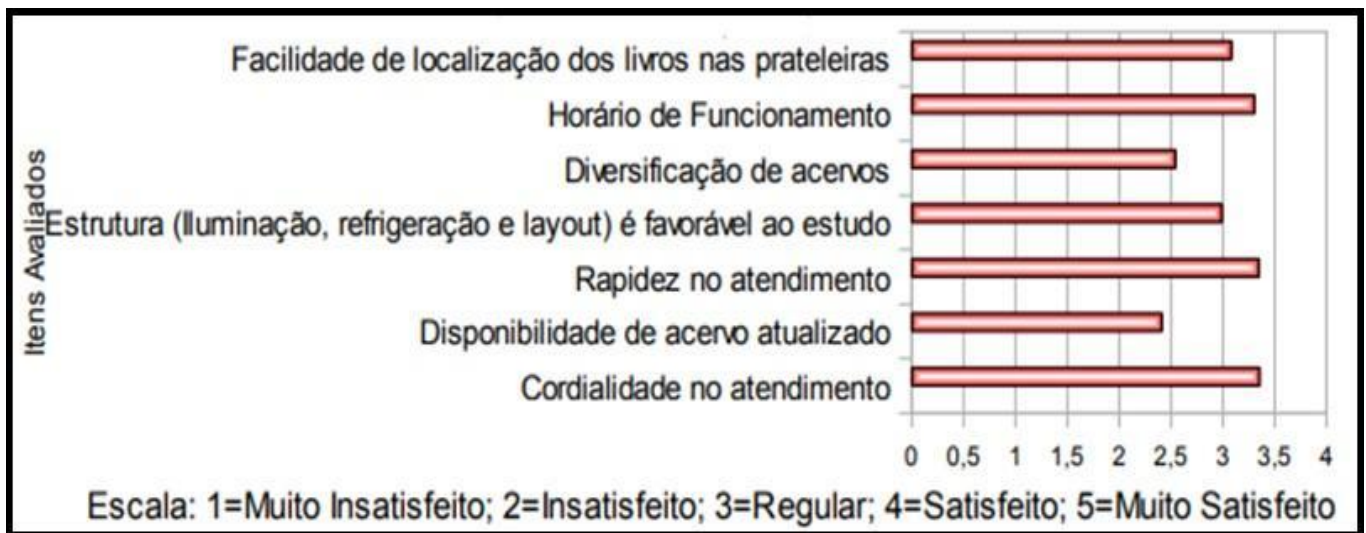
Figure 5 – Average Score of seven items of the Library Requirement
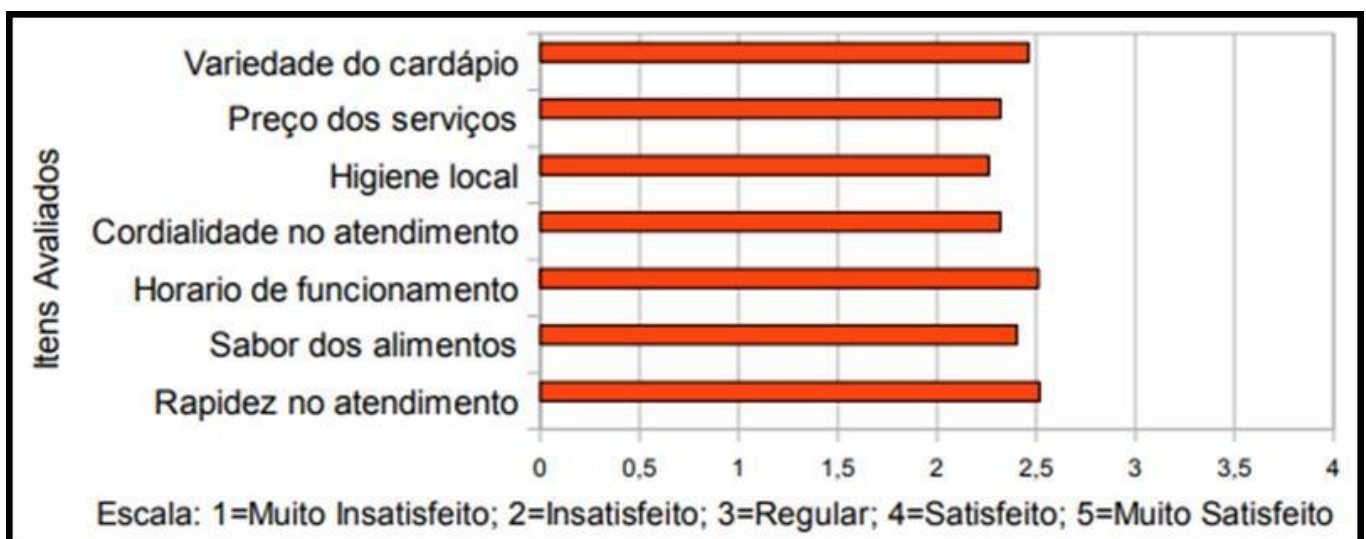
Source: Author

Figure 6 – Average Score of seven items of the Restaurant Requirement

Source: Author

Regarding the Restaurant (Figure 4), the 118 students who answered this question are not satisfied with the services offered (Average = 2.4), as all 7 items had an average below Regular, worrying about the items hygiene in the place, the friendliness of the service, the prices and the taste of the food (Figure 6).

Regarding Teachers (See Figure 4), the 119 students are not satisfied with the services (Average = 2.49) offered by the teachers who teach Industrial Engineering subjects.

Looking more carefully at the items related to the Teachers (Figure 7), most of them had an average below Regular, and the dissatisfaction is bigger because the teachers did not present partial grades and frequencies before the final exam, not available at all period; not being assiduous with their frequencies; not have a continuous system of evaluation of their performances.

Also, the students, in general, were not satisfied with the teaching methodology and the dynamics of the classes. The only item that had general approval was the mastery of subjects.
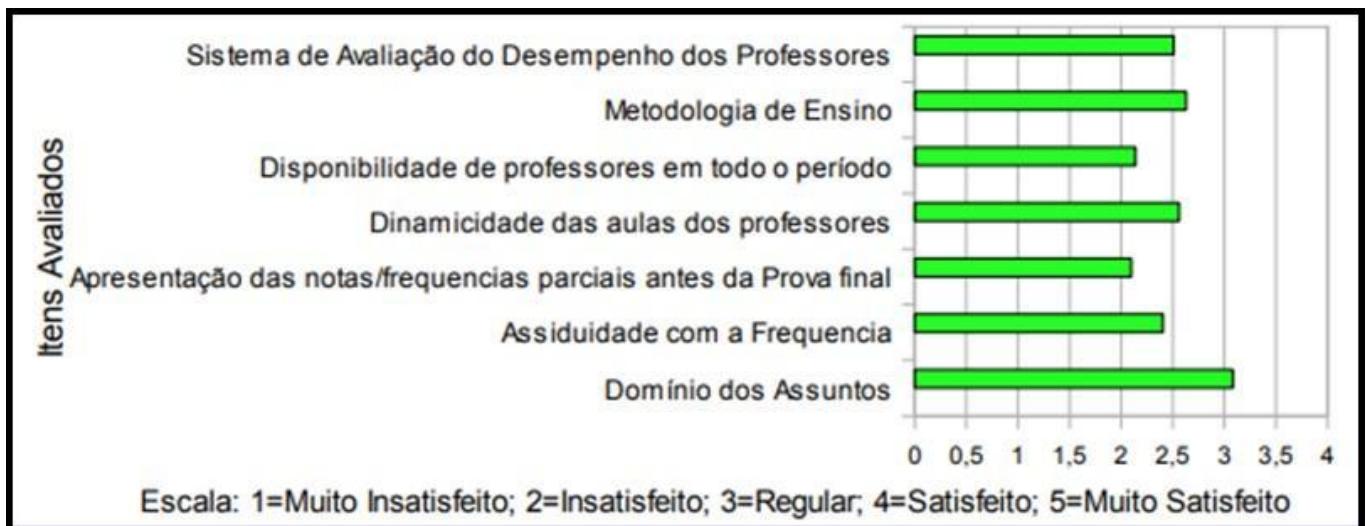
Figure 7 – Average Score of seven items of the Professors Requirement

Source: Author

Regarding the Pedagogical Methods (Figure 4), the 117 respondents were not satisfied (Average = 2.31) with the pedagogical methods adopted in the FT/UFAM.

The items related to the Pedagogical Methods (Figure 8) had an average below Regular, and dissatisfaction is observed in the following order: 1a) offer of summer courses; 2a) conducting related Industrial Engineering events; 3rd) the internship program; 4th) application of theory to practical knowledge; 5th) offer of optional subjects; 6th) update of the curriculum and the 7th) compliance with the teaching plan.
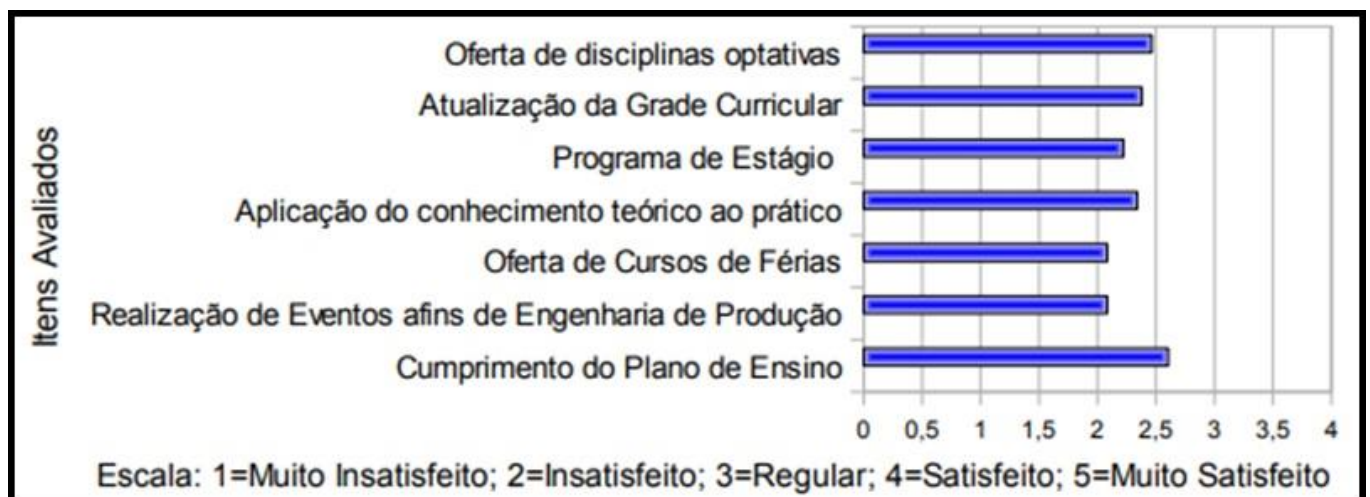

Figure 8 – Average Score of seven items of the Pedagogical Method Requirement
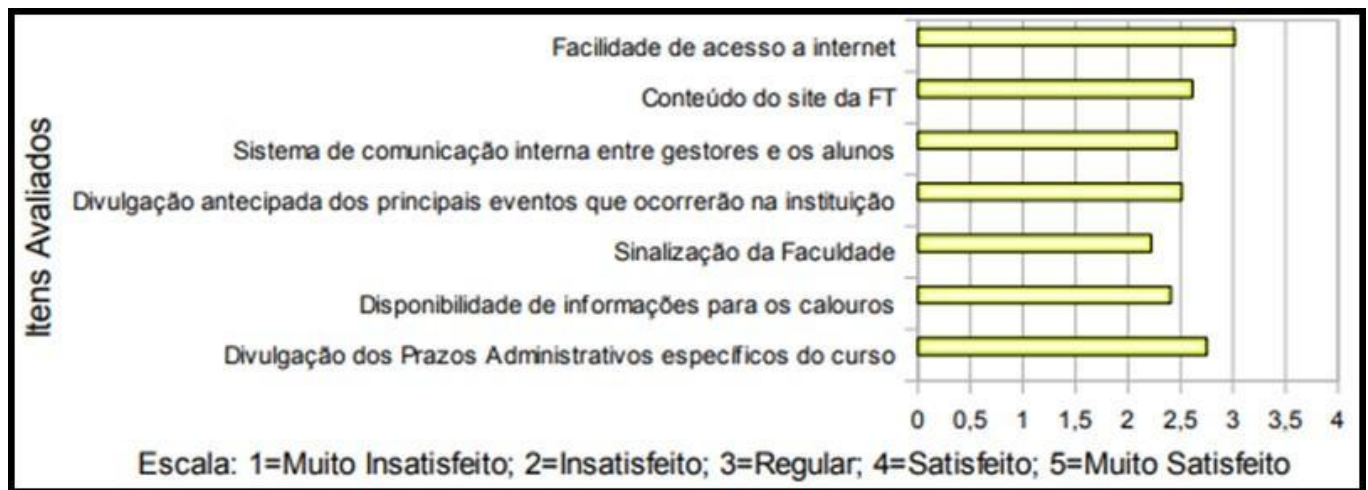
Source: Author

Figure 9 – Average Score of seven items of the Communication Requirement

Source: Author

Analyzing the Communication Requirement (Figure 4), the 118 students who answered the question are not satisfied with the existing Communication process at FT (Average = 2.57).

With the exception of the item "ease of access to the Internet" (Figure 9), considered on average as Regular, students' dissatisfaction is with: the Faculty's signaling; the availability of information for freshmen; the communication system between managers and students; early disclosure of the main events that will take place at the institution; the site content and the disclosure of the specific administrative deadlines of the Industrial Engineering course.

Regarding the infrastructure of the FT/UFAM (Figure 4) the satisfaction level of the 114 students who answered the question is between Dissatisfied and Regular (Average = 2.45).
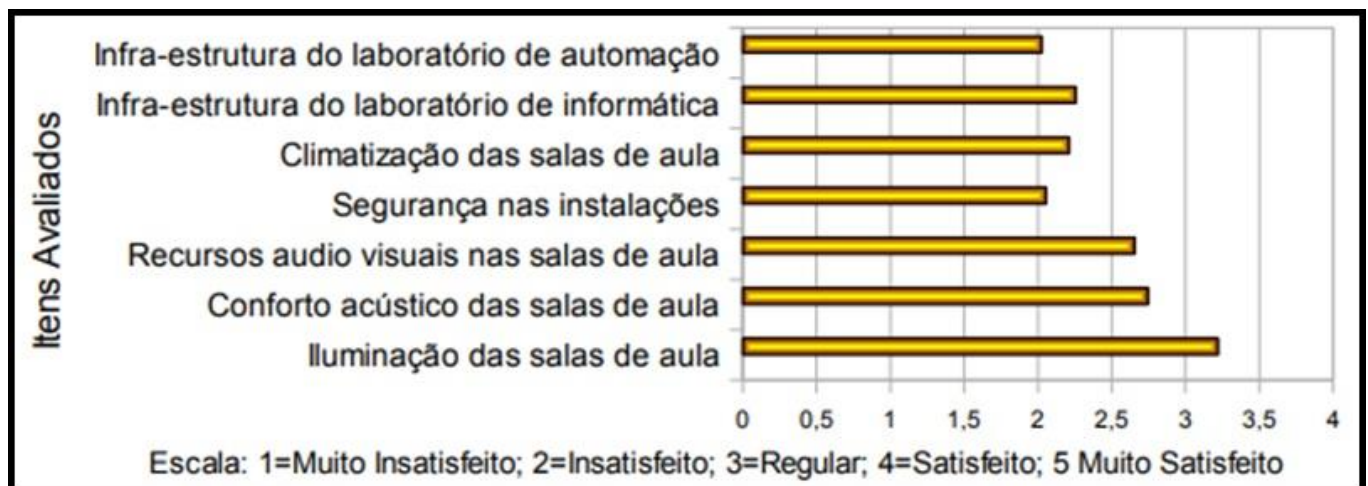

Figure 10 – Average Score of seven items of the Installations Requirement

Source: Author

Except for classroom lighting (Figure 10), considered between Regular and Satisfied, students' dissatisfaction is worrying with their safety in the Faculty; climate control of classrooms; the infrastructure of the automation and computer labs; the audio-visual capacities and acoustic comfort of classrooms.
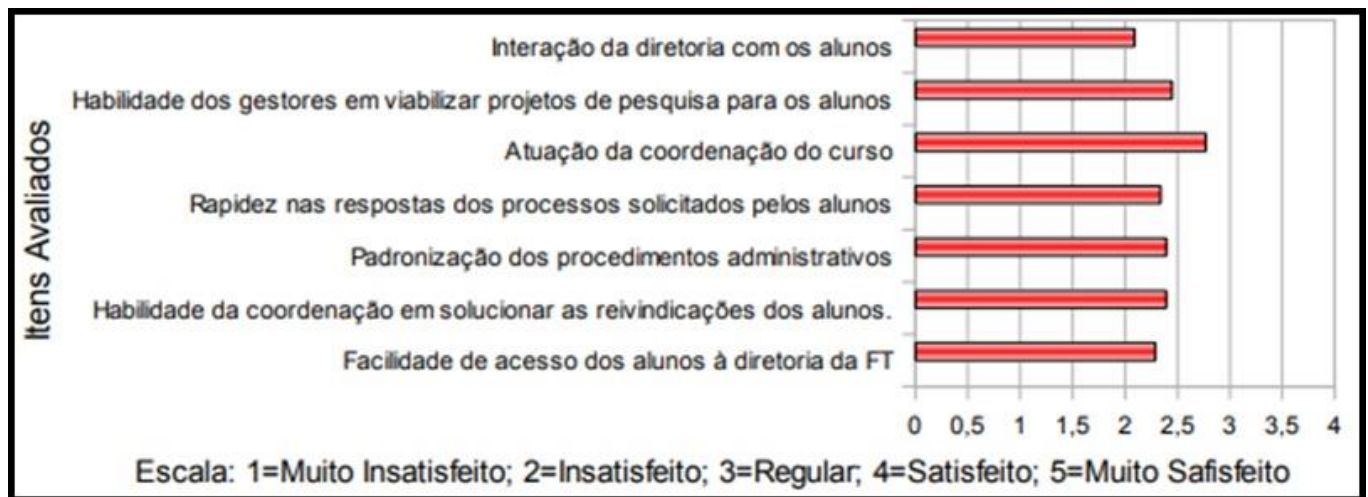
Figure 11 – Average Score of seven items of the Management Requirement

Source: Author

Finally, when analyzing the FT/UFAM Management Requirement (Figure 4), it is observed that, in general, the level of satisfaction of 118 respondents is between Dissatisfied and Regular (Average = 2.39).

A closer look at the performance of FT/UFAM Management items (Figure 11) reveals that students feel dissatisfied with: the low interaction between the Board and students; low level of ease of student access to the FT Board; delay to respond to processes requested by students; the need to standardize administrative procedures; poor ability of course coordination to discuss student claims; low ability of managers to enable research projects for students and the performance of the course coordinator.

5. Conclusions and recommendations

The general objective of the research is to develop in a participatory way a methodology to continuously evaluate the level of satisfaction of the students of the Industrial Engineering course with the main services provided at FT/UFAM.

From the analysis of the results, the following conclusions and recommendations were reached:

a) It is possible to develop a participatory methodology with students using as strategy the application of their knowledge in professional subjects such as Quality Management, Strategic Planning, Entrepreneurship or Marketing. In this sense, to develop the best data collection instrument, it is recommended that older students be chosen since they already know the reality of the university, as well as have more theoretical bases to better contribute to the development of the stages;

b) The participatory methodology with its data collection model can serve as evaluation tools to contribute to the process of continuous improvement of the services provided at FT/UFAM. Moreover, the methodology proved to be efficient in its application and to motivate the students, once they felt valued and could understand the importance of participative management in the planning of any organization. To be successful, each step needs to be well planned by the teacher or manager interested in applying it in your organization, especially step 3, which involves planning the Survey with developing the questionnaire and applying it over time. The limitation of this research was no existence of a more rigorous test involving more advanced techniques of inferential statistics to approve the questionnaire, as well as to project what

happens to the student population. Besides, the questionnaire was not applied to the teachers, technicians, and managers of FT/UFAM, leaving the suggestion of new research to update the one conducted in 2010;

c) In 2010 there was a high rate of student dissatisfaction (overall average = 3.044) with most of the requirements and items evaluated, and it was necessary to identify ways to develop cross-functional teams to urgently improve the top ten worst items: Automation Lab Infrastructure (Average 2.03); Safety (Average = 2.06); Realization of related events of Industrial Engineering (Average = 2.08); Offer of summer courses (Average = 2.08); FT Board interaction with students (Average = 2.09); Presentation by teachers of grades and partial frequencies before the Final Exam (Average = 2.1); Availability of teachers throughout the period (Average = 2.14); Internship Program (Average = 2.22) and College Signaling (Average = 2.22). Another recommendation would be to adopt collective problem analysis and solution tools presented by Silva (2018), some of which have already been tested in a community and academic environment by the author;

d) Finally, for the proper use and improvement of the methodology, the following procedure is proposed for FT/UFAM managers: to increase student participation in the college management process; where appropriate, revise and refine the methodology with stakeholders; elect the representative of each group; present the data collection model (questionnaire) to the parties involved; at the end of each two months, the representative can make the assessment with the users, compiling the data in a standard spreadsheet and sending it to the manager, boss or coordinator; this person can compile all data from the spreadsheets received and generate a general report. At a quarterly meeting, stakeholders could study the results and make the work plan to refine the points identified as needing improvement. In this sense, with the advancement of technologies, a research and development project could develop applications to adapt the methodology and/or model proposed in this article.

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7. References

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