Sharing Information and Knowledge Between Brazilian Researchers

Fernanda Cristina Barbosa Pereira Queiroz
Post-doctorate in Science, Management and Information Technology. PhD and Master in Production Engineering. Graduation in Economic Sciences. Professor at the Production Engineering Department at the Universidade Federal do Rio Grande do Norte (UFRN).

Yan Sávio Alves da Costa
Master in Production Engineering. Graduation in Electrical Engineering.
Universidade Federal do Rio Grande do Norte

Jamerson Viegas Queiroz
Post-doctorate in Science and Technology. PhD and Master in Production Engineering. Graduation in Economic Sciences. Professor at the Universidade Federal do Rio Grande do Norte (UFRN).

Nilton Cesar Lima
Doctor and Master in Administration. Specialization in Accounting. Graduations in Accounting and Economic Sciences. Professor at the Faculty of Accounting Sciences of Universidade Federal de Uberlândia (UFU)

Christian Luiz da Silva
Post-doctoral. PhD and Master in Production Engineering. Graduation in Economic Sciences. Professor at the Universidade Tecnológica Federal do Paraná (UTFPR).

Marciano Furukava
PhD in Materials Science and Engineering. Master in Mechanical Engineering. Graduation in Mechanical Engineering. Professor of Universidade Federal do Rio Grande do Norte (UFRN).

Summary

The CIC among Brazilian researchers refers to the activity of providing information and knowledge that enables the joint work of experts for the resolution of problems and development of new ideas or theories, which usually result in joint scientific publications. Thus, the objective of this article is to elaborate a model that relates the factors that influence the diffusion of the CIC among Brazilian researchers in the modality "productivity" of CNPq, as mechanisms for generating innovations and new knowledge, measured by scientific production. As for the method, in a first moment a bibliographic research was carried out to evaluate existing models in the literature regarding the determining factors of the ICC on the capacity of innovation and generation of innovations in the HEIs, especially in the research groups. Next, the structural and measurement model was elaborated and validated using an online questionnaire for data collection, with five-point likert questions, sent to researchers in the productivity modality in research, levels SR, 2,

1A, 1B and 1C of CNPq. The questionnaire was answered by 262 researchers and the collected data were analyzed using the SEM analysis instrument based on PLS. The results found indicated that the hypotheses of the model were accepted. The results revealed that the individual characteristics of the researchers, the organizational characteristics and the technology contribute to the CIC, which in turn favors the generation of publications and promotion of knowledge. In addition, individual characteristics and publications contribute to the advancement of innovation.

Keywords: Information and knowledge sharing. Innovation capacity. Scientific production. Brazilian Researchers.

1. Introduction

The dynamism with the changes that occurred in the last decades, with the technological advances and the consumption requirements of differentiated products, makes the companies operate in a global competitive environment and justify the fact of the agents of diverse activities to share information and knowledge in a selected scenario for great disruptions, innovations and mobility between people in search of new challenges, advantages and opportunities.

Knowledge Sharing (CC) refers to the task of providing information and know-how to assist and collaborate with others in solving problems, in order to develop new ideas or implement policies or procedures (WANG; NOE; WANG, 2014; Wang; HOU, 2015). Therefore, information sharing occurs with the exchange of elements of determined knowledge, which can even occur between an organization, setting up an organizational learning environment (TAPSCOTT; WILLIAMS, 2007).

No corporate environment with knowledge dissemination created, identified or captured, can be reached by people and technology, configuring a circular stage and representing a form of management by the organization (LEE; LIU; WU, 2011; ZHOU; LI 2012; OYEMOMI et al., 2019).

At the academy, scientists generate knowledge by validating scientific checks previously promoted, and also constituting new advances or discoveries, which once shared are shared with the development of society. For it to be shared, knowledge needs to be created first. The CC among scientists according to Oliveira, Curado and Henriques (2019), is usually promoted by the research leader, especially when it is attributed to highly productive research. Which academy represents or place to create and share knowledge, therefore, such sharing among academics is relevant because it is the first instance in the prototyping of new knowledge, capable of offering applied innovations (NAVIMIPOUR; CHARBAND, 2016; PARK; GABBARD, 2018).

The present study seeks the proportion of a model of Information and Knowledge Sharing (CIC) among researchers in Brazil, which applies broad reflexes in the generation of innovation and quality scientific production, to treat studies focusing on research under an “experimental” modality” Of the National Council for Scientific and Technological Development (CNPq).

Given this purpose, the problematization of this study is concretized in "how to share information and knowledge between researchers and their peers contributed to the generation of innovation and improvement of scientific production?". In view of the exposure, the present investigation aims to develop a model that lists the factors that influence the CIC among academic researchers in Brazil. Such reach, in

the alternative, if the following objectives are specified: i) select, analyze and develop models that are related as studied variables; ii) to characterize the profile of the respondents; iii) discover the factors that facilitate CIC; and, iv) relate the factors of the CIC to the capacity for innovation and organizational performance.

This work is justified by the relevance of the theme and by allowing a better understanding of the factors and reasons why users share information and how this collaboration translates into the increase and generation of new knowledge that is also shared, through scientific production. Therefore, you can obtain empirical empirical data that can contribute to the allocation of human and material resources that impact on the relationship and dissemination of knowledge.

2. Sharing information and knowledge

Some studies about the CIC reveal the understanding that its polarization is aimed at organizations that demand access to new knowledge aiming at innovation. The CIC between teams, agents, people or organizations is a process that involves the movement of knowledge from a source to a recipient and the subsequent absorption and use of that knowledge, with the aim of improving the capacity to capitalize on past experiences and perform activities. (CUMMINGS, 2004; RUPAK et al., 2008).

The understanding about CC for Lin (2007), demonstrates that there is a necessary cultural relationship due to the social interaction in which the exchange of knowledge, experiences and skills occurs. In the view of Ipe (2003) sharing knowledge is basically the act of making knowledge available to others in such a way that it can be used.

The CC together with information between various individuals from different backgrounds, perspectives and motivations becomes a fundamental step towards creating organizational learning by allowing organizations to obtain competitive advantages, reducing rework and costs, improving customer satisfaction and allowing more flexibility to adapt to changes. Organizations, according to Tapsctott and Williams (2007), are able to build knowledge, and when it comes from cooperation and sharing information, it also brings up new collaborative capacities and business models that empower companies. It is also admitted that, sharing a certain knowledge, represents sharing something that has been proven, tested, investigated and accepted as true in a universe of agents involved. So, the information that transits as a means of conveying conceived knowledge, is configured in the way of catalyzing and organizing elements that can form by-products to reach new discoveries.

The CIC depends on interaction and relationships between people, coming up against individual beliefs, values and customs that integrate the organizational culture (DI CHIARA, ALCARÁ; TOMAEL, 2010). It is a communication process that includes the owner who externalizes his knowledge and someone who demands knowledge (HENDRIKS, 1999).

For Cyr and Choo (2010), if on the one hand the CC among employees allows organizations to grow by knowing the experience of the past, which makes it possible to solve problems more quickly, develop new ideas and insights, and avoid rework or repeat work. past mistakes, there is also the understanding that the CC is a more ambiguous proposal, as it requires the employee to spend time and effort to share the knowledge and there is generally concern about how the knowledge will be received and

put to use by others. In organizational contexts, information and knowledge are commonly associated with power.

It is this tension between organizational intent and individual fears that makes CC a significant challenge in organizations (CYR; CHOO, 2010). The authors go on to state that there is little research that analyzes the factors that influence individuals to share knowledge with others in the organization.

This new idea of knowledge management passes on to employees the idea of innovation and, moreover, of creation. And, the purpose with which knowledge transits or diffuses among researchers in different institutions is due to the way in which knowledge management occurs. This can be translated into more developed and innovative end products, always in an intelligent way. However, it is necessary to use specific management practices to encourage intelligent management activities. These management practices also serve as a solution for activities that present problems that require immediate solutions. Thus, management facilitates the sharing of information and assists in quick-reach solutions, requiring creativity, and must also occur concurrently with the construction of the CC. Thus, impacting the financial organization and its performance (GIAMPAOLI; CIAMBOTTI; BONTIS, 2017). Therefore, sharing knowledge has in its essence the development of science and innovation. On the other hand, research agents and other individuals are aware of information as an instrument from which it will be managed.

The concept of innovation is also addressed by Ashok, Narula and Martinez-Noya (2016). The study of these researchers considers various types of users or individuals located, for example, in organizations with research activities, thus resulting in conclusions that illustrate a way of managing knowledge as a direct differential in the innovation program in processes of radical and incremental changes.

In this context, Curado, Munoz-Pascual and Galende (2017), complement the importance of value in sharing information and their positive action in the development of an organization's learning capacity. Thus, it is observed that learning is capable of generating a certain knowledge and develops naturally with the coexistence of information sharing. The information transmission process is related to the capacity of the level of innovation proposed by the organization. Sharing, which in turn promotes learning ability, translates into product innovation generating new knowledge.

George-Walker and Tyler (2014), carried out several studies related to the process of collaboration with the development of knowledge through conceptual mapping, and showed that the function of collaborative mapping incorporates processes that help in the development and generation of new products. Exploration and articulation are examples implemented in this context, with sharing as a key element for a good research team development.

In a complementary way, the study pointed out by Dixon (2000, p. 144), through research with American companies, demonstrated that there are five different ways of CC. The first is Serial Transfer, and occurs when the knowledge that a team acquires when carrying out an activity is transferred to the same team when carrying out subsequent work in a different context. Another is the Close Transfer, where the knowledge that a team acquired when performing a frequent and repetitive task is reused by other teams that perform similar activities. Distant Transfer means the knowledge that a team has acquired when carrying out a non-routine activity and that is made available to other teams in the organization that carry out similar activities. Strategic Transfer is the collective knowledge of the organization necessary for the

achievement of strategies. And finally, the Expert Transfer, which occurs when a team needs to solve a problem and does not have information for decision making, and therefore seeks knowledge from specialists in the organization. Such ways of transferring or sharing knowledge denote a way of organizing, and demonstrates that its transition occurs with the cooperation of information.

Although there are studies that show the importance of CIC in organizations that work with research and development, there are several other empirical studies that reveal the lack of individual and organizational characteristics that prevent sharing (TOHIDINIA; MOSAKHANI, 2010; WANG; NOE; WANG, 2014). The factors that influence the CIC among individuals in organizations are found in the motivation for the act of the opportunity provided, for sharing and revealing the culture of a work environment. There is also the understanding that the organizational identity can be compromised by revealing competences regarding generation through innovation and development (IPE, 2003).

However, CIC is facilitated through people and technology (LEE; LIU; WU, 2011). Although technology can assist in the facilitation process with the capture and distribution of knowledge, the emphasis should be placed on the organization and not on the knowledge itself, by a particular individual. Hence the need to manage knowledge. Koh and Kim (2004), suggest a way to manage an intangible asset, which is promoting the strengthening of the organizational identity through knowledge management. For this, it is necessary a corporate environment that chooses its organizational identity above its intangible attributes, whose understanding is also understood by Crane (2012) as a way of making norms and values unite and strengthen the image of the organization in favor cooperation in market consolidation.

For Hsu (2006), there are three approaches to analyze the CIC: the tools-based approach, the incentives-based approach and the integrative approach. The tool-based approach centers the discussion on the use of information technology for CC (KIM; LEE, 2006; TOHIDINIA; MOSAKHANI, 2010). The second view is based on rationality, as it is believed that employees are willing to share knowledge if there is managerial support that encourages them through rewards. Characterizing the circularization of information as a processing part in the generation of new knowledge from sharing. This approach is centered on the use of incentives to promote knowledge sharing (WOLFE; LORAAS, 2008). And the integrating approach comprises social factors, whether individual or organizational, which in a way is typical in academic environments (IPE, 2003; ORDAZ et al., 2009).

In the conception of Oliveira, Curado and Henriques (2019), the act of sharing between scientists and other individuals linked to research, represents the element of transaction, which now this one does, in exchange for knowledge. This exchange means the resource element, whose relationship established in sharing promotes a positive gain or result to the scientist, which is a result understood as profit. Therefore, sharing knowledge represents a series of resource transactions that are based on the perception of the benefit that will come from this behavior, conceiving profit. It is noticed that the authors start from a premise in which a scientist hopes to obtain benefits from sharing knowledge. This benefit for scientists, when maximized, contributes to the advancement of science (PARK; GABBARD, 2018). Such a characteristic, therefore, demonstrates that the fact that some scientists or even individuals from a certain organization or institution, are likely to share knowledge, with a common goal of prospering and generating the advance of science.

Research leaders are responsible for applying CIC strategies (LIN; LEE, 2004; LIU; PHILLIPS, 2011). The research leader must share knowledge, helping others to achieve goals, and encourage knowledge management practices (DONATE; SÁNCHEZ DE PABLO, 2015; ZHANG; CHENG, 2015). In a way, the leaders of a given research cooperate with the learning processes (VIITALA, 2004). However, it is also worth mentioning the existence of research leaders, who are afraid to share what they know, in the sense that they think that such an act will limit their characteristic of differentiating themselves from their colleagues involved in research, and consequently generating impact negative about CC and the advancement of science (BOCK et al., 2005; RENZL, 2008).

2.1 Factors that influence Information and Knowledge Sharing

According to Riege (2005), people's capacity for CIC depends, first of all, on their communication skills. Effective communication, both verbal and written, is essential for knowledge sharing (DAVENPORT; PRUSAK, 1998). At the individual level, CIC facilitators are related to those of an intimate nature such as expectations, values, attitudes, perception, personality, emotions, feelings, disposition and motivation.

Some studies highlight social networks and the ability of people to interact as facilitators for the CIC (BARON; MARKMAN, 2000; INGRAM; BAUM, 1997; NAHAPIET; GHOSHAL, 1998). Social interactions prior to the process, the formation and development of communities, collective and individual feedback and interpersonal cooperation, are mechanisms that facilitate sharing (CHO et al., 2007). Similarity, familiarity and friendliness are motivators for people to share information within a group (PHILLIPS et al., 2004).

Trust relationships also influence knowledge sharing. Thus, the quality of the relationship between coworkers associated with the perception of competence and professionalism contributes to someone being willing to share (HO et al., 2012; HOLSTE; FIELDS, 2010; KHVATOVA et al., 2016; KUO, 2013; LUCAS, 2005). For Fullwood, Rowley, and Mclean (2018), social exchange and trust are important requirements in the dissemination of knowledge. From them, it becomes easy the initial step for sharing information and, consequently, the development of new techniques in teaching and research institutions for the constitution of knowledge.

In addition, face-to-face contact was another very significant point. When contact between people in a particular department is increased, social cohesion grows significantly. Making trust progress within research centers. However, the archaic structure of these scientific development centers hinders the progress of information sharing. Therefore, information sharing is an intrinsic condition to the existence of the CC, thus constituting the CCI.

Individual factors are decisive for the CCI, and in most cases, workers are the ones who effectively decide whether they want to share their knowledge or not (DUGUID, 2005). Although technology can facilitate the storage of explicit knowledge, tacit knowledge resides in people's minds and its availability and use depend on individual relationships and decisions (HOLSTE; FIELDS, 2010). Specifically, in the case of a research, development and innovation environment, an item that can facilitate or delay the voluntary sharing of knowledge is the reputation of the recipient (ENSIGN; HEBERT, 2010). Therefore, both the past behavior of the recipient and the expectations of actions in the future influence the transmitter

of knowledge to share or not. The recipients' perspective plays a critical role in affecting the motivation of participants in the sharing process (ZHANG; JIANG, 2015).

Among the research scientists, there is a characteristic expected at the CCI, which is to obtain a benefit regarding the recognition of the maximization and advancement of science, which is only achieved when sharing by contributing to the academy (PARK; GABBARD, 2018). In other words, the scientist wants to be recognized as a contributing agent of maximization and innovation in science, as this is his greatest benefit.

It was found that individual factors within teaching centers, or academic environments, are more determinant in the ICC than in places where they depend on cultural aspects that are adapted to the organizational condition of sharing. Within the organizational culture, the role of leadership has, in a way, a great weight compared to autonomy. It is at this point that the concept of rewards is introduced. Exposing, in a way, that top management must guarantee, above all, sharing within the current departments and that the rewards assume a liaison role within the inserted department. In this regard, according to Al-Kurdi, El-Haddadeh, and Eldabi (2018), information sharing provides, in the future, the basis for studies related to technological areas.

Sharing also helps senior management in the process of developing strategies in higher education institutions. Therefore, the technological area needs an information sharing base. That base will support new developments in the future. Based on this, information sharing provides a solid basis for scientific progress, as it facilitates the exchange of ideas in favor of innovative strategies. Also, it is known that sharing is a key point for the study and application of institutional strategies aimed at the progress of higher education. In this way, the new scientific publications will have more harmony in relation to the shared scientific base. The condition for the CIC to occur for the scientist is that there is solid knowledge to share; and, they are more likely to occur when there is a team leader, who has high intensity in his research work and who is not afraid of losing value and power after the CIC (OLIVEIRA et al., 2019).

Sergeeva and Andreeva (2016), carried out empirical studies on information sharing. In relation to organizational variables, it is known that knowledge sharing among individuals in an organization cannot be forced, since it does not have a characteristic whose benefit is given by recognition, as occurs among scientists in academia. Therefore, the organization encourages organizational policies, which is also facilitated by the organizational structure itself (KUO, 2013). The factors that favor the CIC are related to strategy, management model, organizational structure, infrastructure, size of business units, leadership, culture, organizational climate and reward systems (PAGHALED et al., 2011; TOHIDINIA; MOSAKHANI, 2010).

Some organizations grant rewards and technological facilities to their employees in order to stimulate the CIC. The encouragement of sharing, the motivation of people for cooperation, collaborative behavior and the relationship of trust are also influenced by the organizational culture (ISLAM et al., 2015).

There are studies that reveal the importance of developing a culture of sharing, so that institutions continue to grow, as this is also a way of being recognized (ANNANSINGH et al., 2018). In this sense, information sharing is, more precisely, a matter of organizational culture, whose companies attribute it as a form of institutional growth, configuring development as a natural process capable of even strengthening the organization's identity, as already highlighted.

Finally, among the factors that enable CIC among employees of organizations, are Information and Communications Technologies (ICTs), with emphasis on information systems, media and social networks. Fauzi, Tan and Ramayah (2018) highlight that social media develop exponentially. The information technology area is on the rise and, along with this, popular social networks - such as Facebook, Twitter, Instagram and Linkedln - become tools used daily by a large portion of the population to share information. In conjunction with research tools - such as Google - access to information in the 21st century is therefore much more accessible and dynamic. These mechanisms, in the academic environment, can facilitate agility in the communication process of research published among the most diverse journals, and in a way accelerate the reach of new knowledge and, reward the benefits expected by researchers, which is recognition.

The technology allows organizations to expand social networks and create effective collaboration. In this way, ICT's improve communication between specialists, virtually bring people together and promote exchange (HENDRIKS, 1999). Thus, the technological infrastructure moderates the relationship between organizational culture and organizational structure with knowledge sharing (ISLAM et al., 2015). Communication between people, located in different places, is easier, which contributes to the CIC and even in the acceleration and discovery of new knowledge. Access to ICT's enables a faster search for access to information and knowledge; and, social networks allow the creation of a network for the propagation of information through the continuous and lasting relationship of the participating communities, including the academic community, (JOLAEE et al., 2014; KIM; LEE, 2006; LIN, 2007; TOHIDINIA ; MOSAKHANI, 2010).

3. Methodological procedures

This work used an exploratory-descriptive quantitative approach, aiming to collect data from the response of individuals, for later statistical treatment. The research population is represented by researchers in the "productivity" mode in research. In other words, it covers researchers with active projects and research funded by the National Council for Scientific and Technological Development (CNPq). The sampling was non-probabilistic and convenient for a population of 15,232. The study sample was obtained by searching the CNPq website for researchers "productivity", whose contact was via e-mail in the first three months of 2019. It was possible to reach 262 respondents, understood as the sample field of the study. Considering the minimum number of observations between five and ten respondents for each variable (HAIR et al., 2017), for the applied questionnaire composed of 16 statements, associated with the sample obtained from 262 respondent researchers, it was possible to perform an analysis under a size 1,63 times higher than the minimum required, and is therefore satisfactory.

The data collection process was carried out through the survey monkey platform and the data collection instrument was sent by e-mail to the "productivity" researchers. The questionnaire applied was composed of two blocks, the first of which was formed by questions related to the respondent's profile, and the second has 16 objective statements that address the variables of analysis. The quantitative approach method used is based on Structural Equation Modeling (SEM) and Partial Least Squares (PLS), used to test

the hypotheses of causality between variables. The application of the method and the modeling found was through the SmartPLS software, version 3.2.8.

This study proposed some research hypotheses:

H1: the researcher's individual characteristics contribute to the generation of scientific publications;

H2: the researcher's individual characteristics contribute to innovation;

H3: organizational characteristics contribute to the generation of scientific publications;

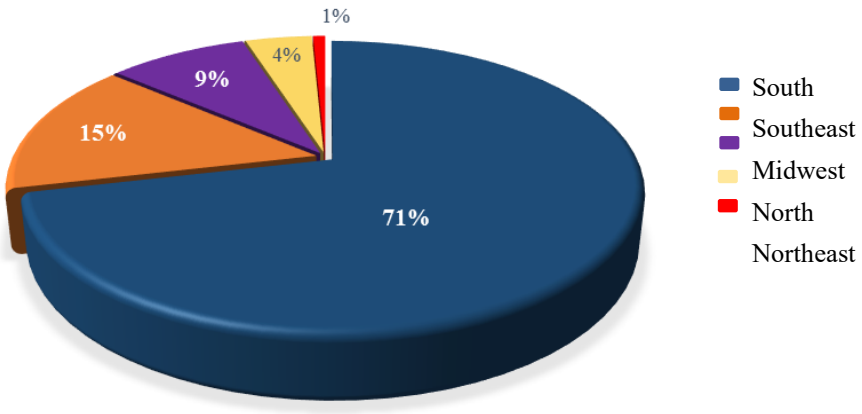
H4: technology contributes to the generation of scientific publications;

H5: the pulsations contribute to innovation.

4. Results

Initially analyzing the profile of the respondents, it was found that 60.31% are 60 years old or older; 35.11% are between 50 and 59 years old and the rest are under 50 years old. Respondents are productivity researchers, with an average research time of 21 years. Regarding gender, 75.19% are male, 24.81% are female. The sample obtained was composed of 252 (96.18%) Brazilian researchers and 10 (3.82%) foreigners. Most researchers live in the Southeast (71.37%), and the region with the lowest participation of researchers in the sample comprises the North (0.76%), according to Graph 01.

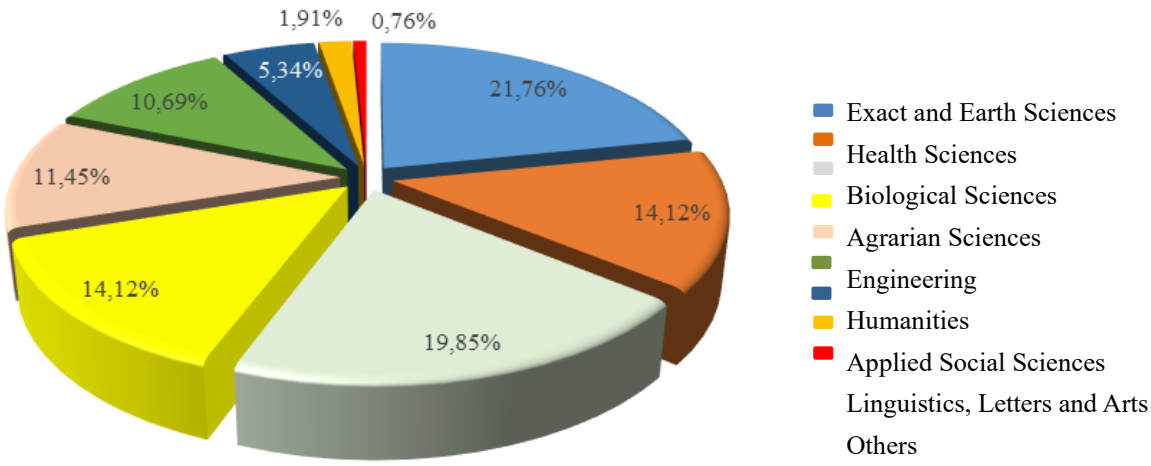
Graph 01 - Number of researchers by region



Source: The authors.

Regarding the researcher's knowledge area, most respondents are concentrated in the area of Exact and Earth Sciences, as shown in Graph 02. Among the respondents, the following categories of researchers were obtained from CNPq productivity: 1A (58, 02%), 1B (32.82%), 1C (2.67%), 2 (0.38%) and Senior (6.11%).

Graph 02 - Research areas



Source: The authors.

Before starting with the measurement model, it was necessary to recode the responses obtained for the variables that were inverted in the questionnaire in order to reduce the respondents' tendency to agree with the statements. Continuing with the import of data into SmartPLS, therefore, the measurement model was constructed as shown in Figure 1.

The analysis parameters adopted are in line with those proposed by Hair, Hult, Ringle, and Sarstedt (2017), whose indicators with external loads between 0.40 and 0.70 should be considered for removal of the scale only when the exclusion of the indicator leads to an increase in Composite Reliability or Average Extracted Variance (VME). Thus, the variable R_11 was removed from the measurement model, which had the lowest external load (0.476), as shown in Figure 1. The values for the convergent validity and quality indicators are shown in Table 1.

Table 1 - Criteria related to quality and convergent validity

Construct	Alfa de Cronbach	Composite Reliability	VME
Individual Features	0,793	0,857	0,550
Organizational Characteristics	0,714	0,837	0,632
Technology	0,724	0,878	0,782
Publications	0,823	0,894	0,738
Innovation	0,726	0,876	0,780

Source: The authors.

In continuity with the observance of the analysis parameters, Table 1 demonstrates the reach of convergent validity, where the reliability of the internal consistency was analyzed using Cronbach's Alpha, and considering that the values are above 0.70, this criterion was also met. Then, it was observed that the Composite Reliability is also above the reference limit. Regarding the Discriminant Validity (DV) criterion through the Fornell and Larcker method, it was observed, therefore, that this criterion was met for all constructs.

In order to complete the RV analysis and verify that the measurement model is adjusted, it was observed that the cross loads are showing higher factor loads in their respective constructs. According to Hair, Hult, Ringle, and Sarstedt (2017), once the model is considered to be reliable and valid, one must

then proceed with the analysis of the structural model. All variables presented values of Variance Inflation Factors (VIF) less than limit 5, therefore, it is understood that the criterion of absence of collinearity between the variables was met.

The analysis related to the structural model is related to the path coefficients. Considering Table 2, it is observed that the relations are positively stronger between Publications and Innovation (0.380) and Technology and Publications (0.321).

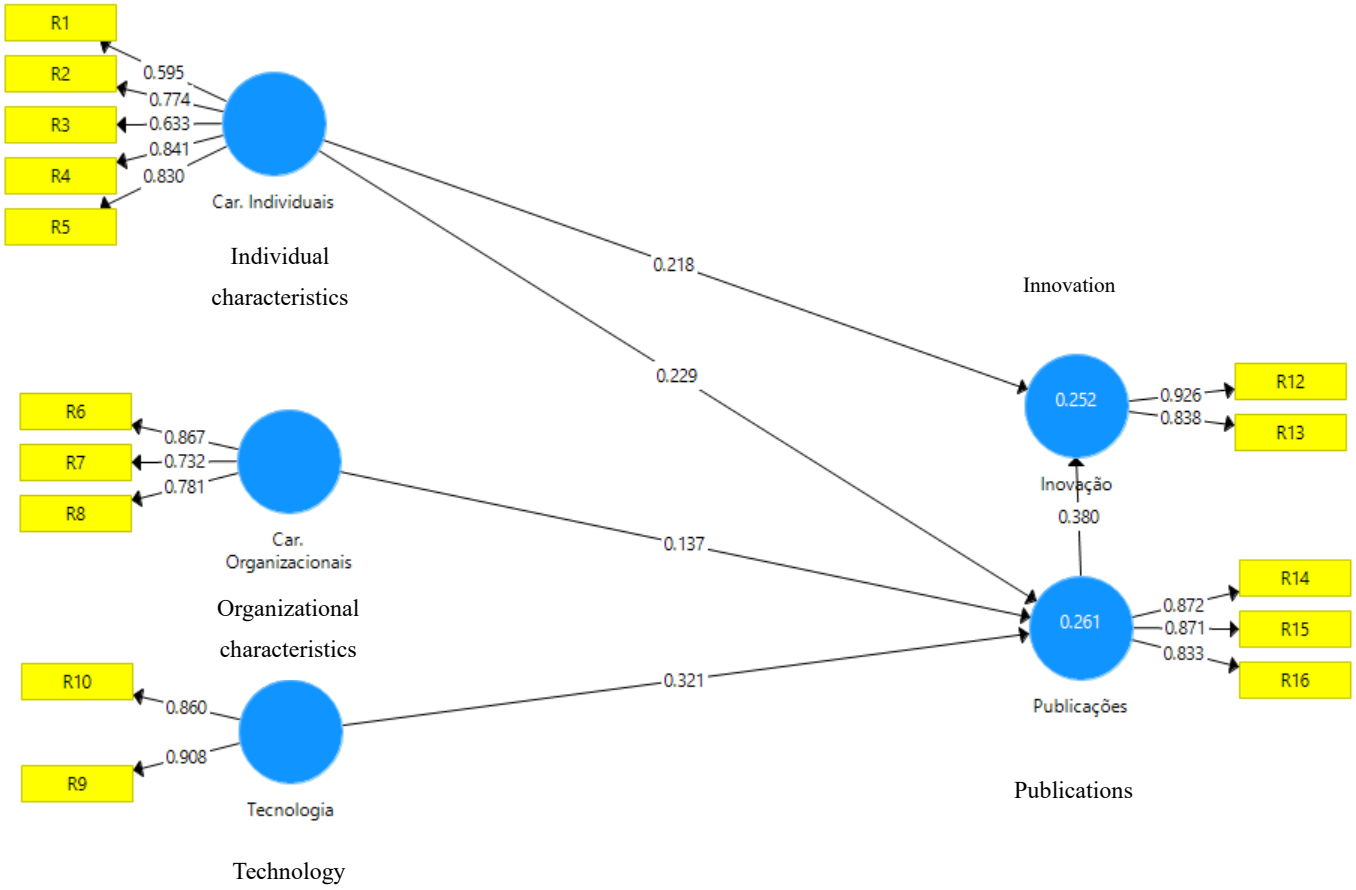
Table 2 - Result of the Path Coefficients Significance Test

	Original coefficient	**Teste *t***	***p value***
Individual characteristics → Publications	0,229	3,495	0,001
Individual characteristics → Inovação	0,218	3,737	0,000
Organizational characteristics → Publications	0,137	3501	0,039
Technology → Publications	0,321	5,425	0,000
Publications → Innovation	0,380	5,684	0,000

Source: The authors.

Still regarding Table 2, one can verify the statistical significance of the path coefficient from the t-test, in which all coefficients are statistically significant at the level of 5%. Evaluating R^2, which corresponds to a measure of predictive accuracy and represents the combined effects of exogenous latent variables on the endogenous latent variable (HAIR et al., 2017), it was obtained, respectively, as values of R^2 and R^2 adjusted for: Innovation (0.252; 0.246) and, Publications (0.261; 0.252); suggesting a large effect (COHEN, 1988). Figure 1 summarizes the measurement and structural model adjusted.

Figure 1 - Measurement and Adjusted Structural Model



Source: The authors.

Then, the values of other indicators of quality of fit of the model were evaluated: Relevance and Predictive Validity (Q2), Stone-Geisser indicator and Effect Size (f2), and Cohen Indicator. With the data obtained, it is clear that the endogenous factor Innovation (0.179) and Publications (0.171) has an average degree of predictive relevance, however, it can be said that all constructs have Q2> 0, providing support for predictive relevance of the model in relation to the endogenous latent variables. The values of f2 evaluate how much each construct is "useful" for the adjustment of the model. The value found 0.167 between Publications and Innovation can be considered average. The other values were considered low.

5. Final Considerations

From the reported results, it is observed that the hypotheses *H1, H2, H3, H4* and *H5* were accepted, therefore, the proposed measurement model attributes factors that influence the CIC among Brazilian researchers from CNPq. The analysis of *H1*, allows us to infer that the variable Individual Characteristics presents a positive relationship (0.218) and significant with the variable Publications. Therefore, it is understood that the Individual Characteristics of the researchers, such as communication skills, confidence, experience, the possibility of teaching and learning with the team, influence the generation of Scientific Publications.

With regard to *H2*, it is observed that it achieved a positive effect (0.218), which indicates that the Individual Characteristics contribute to Innovation.

As for *H3*, it should be noted that, with the results obtained, it can be accepted that Organizational Characteristics, such as equipment, culture and organizational structure, contribute to the generation of Scientific Publications.

Regarding *H4*, it is observed that it has a positive effect (0.321), and therefore, the Technology measured in the model by the variables internet, use of information systems and access to social networks, contributes to the generation of Scientific Publications.

Likewise, *H5* has a positive effect (0.380), and it can be said that Publications, analyzed through the contributions of knowledge sharing for the generation of research, publications of international quality and leadership, contribute to Innovation, measured through increasing the number of patents and generating innovations, associating with organizational characteristics.

For the agenda for future studies, the need to apply the model to other contexts is highlighted, such as the use of CIC associated with startups, and the characteristics of the analysis of potential entrepreneurs, also seeking to assess broader validity parameters, allowing the use of this instrument in different sectors and places, in order to encourage diffusion and its applicability.

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