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## Information Production and Dissemination at a Prominent Research Center in Latin America

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### ABSTRACT

**Objective:** to deepen the understanding of the process of production and dissemination of information at the organizational level, using the analysis of a knowledge-intensive organization.

**Methods:** the organization chosen was a Research and Development Center in the area of Information and Communication Technologies. This organization is a reference in its segment, as it has one of the largest Research and Development programs in Latin America in its area of activity, and its information production and dissemination processes can be applied in other knowledge-intensive organizations, such as research institutions. research in the field of health sciences. To this end, qualitative field research was carried out, using the interview technique. Three professionals from organizational units whose core activities were directly related to the production and dissemination of organizational information were interviewed.

**Results:** only one of the organizational units had information production and dissemination activities described as a formal organizational process.



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**Conclusion:** the results showed that the greatest difficulties faced by organizational units were defining the target audience and, mainly, evaluating the use of information. They also indicated the adoption of good practices in the organization, such as a clear definition of informational needs and adequacy of the use of Information and Communication Technologies in the process of production and dissemination of information.

**Keywords :** information production; information dissemination; information Technology; information systems; information management; knowledge management.

## INTRODUCTION

The production and dissemination of information within an organization can be seen and treated as a process. They therefore involve the appointment of someone responsible for the process, the identification of a set of clients and the introduction of an informational approach, with methods, tools and techniques focused on information. <sup>1</sup> Generally, a process corresponds to an ordered set of activities that transform inputs *into* outputs *and* have a well-defined purpose, <sup>2</sup> having wide application in the organizational context. <sup>3,4</sup>

The process of producing and disseminating information underlies information management practices and, consequently, knowledge. <sup>5</sup> This relationship can be observed in the notes of Davenport <sup>1</sup> who considers the information management process as a structured set of activities that include the way organizations use to obtain, distribute and use information and knowledge. Knowledge management, seen as a systematic process to identify, create, renew and apply strategic knowledge, <sup>6</sup> among other definitions, <sup>7</sup> involves information management, trying



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to add value to information and distribute it.<sup>8</sup> Information management and knowledge management aim to reduce ambiguity and uncertainty in the organization, through access, sharing and use of information.<sup>9</sup>

In this sense, the processes of information management, or the underlying production and dissemination of information, can be approached through the differentiation of a main process or through the analysis of more specific processes that particularly depend on information. In this case, although the processes are in the context of other areas, their relationship occurs primarily with information management, as occurs with market research, competitive intelligence or technological innovation, for example. Considering this distinction, Davenport<sup>1</sup> uses the first approach to present a generic process, consisting of four stages: determining informational requirements, obtaining information, distributing information and using information.

Furthermore, it is important to highlight that Information and Communication Technologies (ICTs)<sup>10</sup> can be used to automate part or all of this process and that, at the end of it, the information must be assimilated by the individual,<sup>11</sup> in order to generate knowledge. ICTs present themselves as an important channel or facilitator for efficient knowledge sharing and knowledge integration.<sup>12</sup> It is also worth highlighting that, regardless of the approach adopted to manage information, it is important to consider the different levels of information for decision making: strategic, tactical and operational. In order to achieve its objectives, information must permeate all these levels in an organization.<sup>13</sup>

Despite the importance of information production and dissemination processes for knowledge-intensive organizations, their implications for information and



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knowledge management, as well as the new possibilities for using ICTs in this process, including recent conceptions such as *big data* and technology applications. In exploration, classification and information architecture activities, many organizations present difficulties in the way they deal with information. Considering the above, this article aimed to deepen the understanding of the process of production and dissemination of information at the organizational level, using the study of a knowledge-intensive organization: a Brazilian Research and Development (R&D) center in the area of ICTs, a reference in Latin America in its segment. This is a case study, whose results and analyzes can be applied to other information and knowledge-intensive organizations, such as, for example, research institutions in the field of health sciences. Thus, the study sought to identify the existence of clear and, possibly, formal processes for the production and dissemination of information, the use of technological resources in this process, as well as the relationship between this process and organizational knowledge.

The relevance of this study lies in its contributions to a better understanding of the process of production and dissemination of information in knowledge-intensive organizations. In this sense, the study highlights the greatest difficulties and good practices identified, with contributions to professional practice and the scientific field, and recommends the adoption of the same parameters used in investigations in similar organizations, with a view to corroborating research on the theme.

THEORETICAL REFERENCE



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The theoretical framework of this research focuses on the following main topics: definition of information needs, obtaining, distributing, using and assimilating information.

## DEFINITION OF INFORMATIONAL NEEDS

The definition of information needs is preceded by the formulation of the problem to be solved. It is through the clear formulation of the problem that a space for solution is created and the information requirements of the task to be performed are determined. <sup>14</sup> *Davenport* , <sup>1</sup> recognizing the different approaches and controversies surrounding the determination of informational requirements, also highlights the importance of defining the problem and the situation to be addressed.

According to this author, the definition of information needs is the responsibility of information professionals. As part of their duties, these professionals need to closely monitor workers as they carry out their work activities, in order to understand their tasks and information needs. Thus, it is possible to identify and understand the various types of information, such as structured and unstructured, formal and informal, or even computerized and non-computerized. This type of monitoring, as highlighted by *Jannuzzi* , <sup>15</sup> has the purpose of mitigating the influence exerted by the cognitive processes of those involved, that is, information professionals and individuals in their work environment.

However, the definition of informational needs is not limited to information professionals, as such needs involve the cognitive processes of users or those who demand information. Therefore, the role of these professionals is to structure the possible representations of information, with a view to access, retrieval and use of information.



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It is observed that highly structured or quantitative information, including financial statistics and operational performance indicators, for example, can be naturally stored, processed and distributed, in the form of data, in computerized systems. On the other hand, information such as unstructured information can contribute to providing context and valuing concrete data.

In this sense, recently the concept of *big data*<sup>16-18</sup> has aroused great interest among organizations, as it involves structured and unstructured data, historical and current, internal and external to the organization. In fact, to meet diverse requirements, information systems must use sources as varied and complex as the environment they seek to represent.

## OBTAINING AND DISTRIBUTING INFORMATION

Once information needs have been identified clearly and precisely, information gathering can begin. This is an uninterrupted stage, the most effective process of which, according to *Davenport*,<sup>1</sup> involves a system of continuous information acquisition, covering the activities of exploring the information environment, classifying information into a relevant structure, as well as formatting and structuring information, not necessarily sequentially.

Due to intrinsic limitations of the human sensory apparatus, information that is not ordered, structured or contained in any way can remain amorphous and unusable.<sup>19</sup> Therefore, the treatment given to information in the context of the process in which it is produced and disseminated in organizations becomes essential.

The information exploration activity can consider two approaches: automated, using ICTs, or human. Generally speaking, the most effective strategy involves a





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combination of both. However, given the wide range of applications of ICTs in the context of information systems,<sup>13,20,21</sup> many organizations tend to have a strategy predominantly based on technological resources.

The activity of classifying information consists of creating categories, which, as it is an abstraction, affects the way in which individuals obtain information. In fact, categorization systems are not neutral, as they privilege a view on certain organizational aspects to the detriment of others. The formatting and structuring of information, in turn, seeks the most appropriate way to attribute meaning to information, adding context, a specific style and a means of presentation.

With regard to the distribution of information, efforts focus on establishing a connection between individuals and the information they need, which in the organizational context is related to their work activities. Thus, in addition to properly carrying out the assessment of information needs and obtaining information, aspects such as informational architecture, political structures and technological investments also guarantee an effective distribution of information.

Information architecture, on the other hand, involves the machine-engineering approach as a way of improving the organization's information environment, but is not limited to it. It also covers a systematized guide that allows the structuring and location of information in the organization. Information policy can be based on models based on the distribution of power<sup>22</sup> or models based on the market, whose criteria for directing information is dictated by demand.

The information distribution strategy is a high-level decision. It refers to the choice about how to distribute information in the organization: should information be disseminated to users or should information be sought by users. In the first case,



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information providers decide what and to whom to distribute the information. In the second case, it is assumed that users are better able to evaluate what information they need. A combination of both cases is also a viable and interesting alternative in several situations.

Furthermore, information needs a channel to be transmitted.<sup>19</sup> In this aspect, ICTs can be used in the distribution of information, as long as this information has been obtained through technological resources in the previous stage of obtaining information. Similar to what occurs in the information obtaining stage, a combination of approaches with ICT support and without technological support is interesting in the information distribution stage. The capabilities of technological resources alone do not necessarily represent improvements in the organization's performance.<sup>23</sup> As pointed out by *Davenport*,<sup>1</sup> the best information systems tend to be hybrid, involving people, documents and computational resources.

## USE AND ASSIMILATION OF INFORMATION

All efforts to produce and disseminate information are in vain if, at the end of the process, the information is not used by the individual. The use of information, however, is totally dependent on the human mind, which makes it difficult to assess how individuals use information.

According to *Davenport*,<sup>1</sup> some practical ways to improve the use of information are use estimates, or intentional access, symbolic actions, the right institutional context and performance evaluation. Usage estimates can be made based on the quantity or frequency with which certain information resources are requested or accessed. In estimates, it is also possible to consider who accesses certain content, respecting, however, the ethical issues involved.





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Symbolic actions refer to executive models, high-level statements and pronouncements about values, rewards and awards, being used to determine desirable behaviors in the organization and encourage the use of information. Commonly, the institutional context for using information is provided through regular meetings with the management body. You can, for example, diversify the types of information used in board meetings, not limiting yourself to financial information.

Performance evaluation can help to institutionalize the use of information, with the adoption of reward and punishment measures. It is possible, for example, to evaluate managers not only based on the results achieved, but also based on the information and processes they use in decision making, or even reward measures for innovative and valuable use of information. According to *Beuren*,<sup>24</sup> the value of information lies in its use. It is directly related to the reduction of uncertainty resulting from the use of information.

However, at a higher stage than the access and use of information, there is the assimilation of information. It corresponds to the process of interaction between an individual and an information structure, which alters the cognitive state of that individual, in order to produce knowledge.<sup>11</sup> It is also worth highlighting that individuals are different from each other and have individual preferences in the way they deal with information and acquire knowledge, including in situations in which they use ICTs.<sup>25,26</sup> The assimilation of information involves learning, which according to *Vakkari*<sup>27</sup> can be seen as modifications in the individual's knowledge structure. Thus, it can also be framed within the internalization process described



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by Nonaka and Takeuchi ,<sup>28,29</sup> in which explicit knowledge is incorporated by the individual in the form of tacit knowledge.

## METHODS

In this study, the qualitative method<sup>30</sup> or, more precisely, qualitative field research was used , using the interview technique. The organization selected to conduct the interviews was a Brazilian R&D Center in the area of ICT, with one of the largest R&D programs in Latin America in its area of activity. The interviews were carried out with three professionals from different organizational units, whose core activities were directly related to the production and dissemination of information, both internally and externally within the organization.

*The interviewees' organizational units were responsible, respectively, for software systems documentation and training , organizational knowledge management and communication with the market. The first interviewee had a bachelor's and master's degree in computer science and held a managerial position in his organizational unit. The second interviewee had a degree in engineering and was a senior professional in knowledge management. The third interviewee had a doctorate in information science and worked as a manager in an organizational advisory unit, directly linked to the executive body, at the strategic level of the organization.*

The interviews in question were semi-structured and had, in general terms, the purpose of identifying whether there was a clear, and possibly formal, process of producing and disseminating information in the organizational unit, how ICTs were used in this process and what the relationship was between such process and



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the generation of knowledge in the organization. The attachment presents the interview script.

In a first contact, via email, the professionals were invited to give interviews. On this occasion, they received clarifications regarding the research objectives and relevance of the ongoing study. Confirmation of the granting of each interview and the respective definitions of location, date and time were carried out by telephone.

The first interview, in particular, served as a pre-test. As it achieved the expected results, the interview guide was considered valid for the purposes of the study, aimed at the search for a deeper understanding of the process of production and dissemination of information at the organizational level. Furthermore, the results of this initial interview were also considered together with the results of the other interviews. All interviews were recorded with the permission of the interviewees and subsequently analyzed.

## RESULTS

### INTERVIEW 1

*The first interviewee reported that his organizational unit prepared and had software product documentation as part of the scope of its activities. The documentation produced, and subsequently disseminated, covered three basic levels: functional, conceptual and a third level focused on sales support. Among the information products generated were manuals and online help resources. In the context of the interview, one type of information product was emphasized by the interviewee: software manuals.*



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According to the interviewee, the main objective of the manuals was to present how to use a specific *software*, that is, to transmit the knowledge, concepts and functions of how a given *software* works. They sought to elucidate the problems that the *software* solves, covering its capabilities and limitations. To prepare manuals, various inputs were used, such as requirements specification and development project documents, in addition to the *software* itself.

For the interviewee, determining the target audience for a manual is not a trivial task. There is difficulty in identifying the intellectual level or training level of the professional who will use the manual. Depending on the situation, the user could be a computer professional or a system administrator. He was a professional in the area of information technology who, as such, had a profile closer to that of the manual's creator, with a common language and vocabulary. In other situations, the manual was intended for management-level professionals, whose interest was in the general understanding of the system they were acquiring. Therefore, the language used in this case was different. There were still situations in which the target audience was made up of professionals from third-party companies who were not willing to read manuals, which generated the need to create other types of information products.

In the interviewee's organizational unit, there was a consensus about what a manual is, as there was a differentiation between typologies. To prepare the manuals, there were models, or *templates*, in addition to care with the formatting of the document, the form of presentation and the language, which had to be shaped according to the vehicle adopted to transmit the information. It is important to highlight that several ways were used to make information available to the user,



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such as directories, pages on the organizational intranet and *compact disks* (CDs) that were sent to users.

The manuals could be evaluated by users through a *call center* maintained by the organization. However, few requests, such as complaints, for example, were forwarded through this channel. The interviewee pointed out that one hypothesis for this low number of requests is the culture of Brazilians who, unlike consumers in the North American and European markets, do not see documentation as a right associated with the acquisition of *software*. Still for the interviewee, many users do not like reading, which places certain limits on textual production, requiring other forms of knowledge transmission, such as training.

It is important to highlight that there was a formal process for preparing manuals described in the organization. Among other models and standards, the organization used the *Capability Maturity Model Integration* (CMMI), aimed at software engineering. It is noteworthy that CMMI is an approach to improving processes, which provides organizations with essential elements of effective processes.<sup>31</sup>

ICTs were widely used in the documentation preparation process. No specific tool was used to manage documentation, as the organization had a specific area with this responsibility. On the other hand, the organizational unit used a configuration management tool to control document versions. Although ICTs were fundamental in the context presented, there was no dependence on a specific tool, the process being determined by the understanding of the activities and not by technological resources. For the interviewee, the manuals were strongly related to organizational knowledge, as they recorded technological advances, reaching the external



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customer, as well as the internal community, even though this was not considered a target audience.

## INTERVIEW 2

The second interviewee belonged to an organizational unit whose scope of activities included the dissemination of knowledge within the organization. In this sense, the organizational unit had two information products with complementary functions: a newspaper on the corporate intranet and a *clipping*. The newspaper focused on covering various topics considered relevant to the organization. *Clipping*, on the other hand, focused on providing specific information aimed at pre-determined users.

The sources of information were diverse, obtained from specialized sources external to the organization. There was a professional responsible for the steps of exploring information sources, collecting news and preparing the daily newspaper. The process of preparing the newspaper was supported by specific *software*, which allows the introduction of titles, figures, summaries, in addition to the full texts of selected news. Another activity carried out by the organizational unit was indexing, essential for carrying out advanced searches. All news was made available on the intranet for a pre-determined time and subsequently archived in a database.

It is also worth highlighting that the process of preparing the newspaper took into account general information needs, based on the activities carried out by the different organizational units. Additionally, monitoring of specific information could be requested by users as a way to obtain targeted information. However, the





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interviewee reports that it was difficult to evaluate the use of information and measure its return to the organization.

The process of production and dissemination of information carried out by the organizational unit was not described as a formal process of the organization. It was created internally by the organizational unit and refined based on its experience. There was *software* for preparing the daily editions of the newspaper. However, the process did not depend on this *software*, which made the *software* replaceable.

In the view of the organizational unit, according to the interviewee's words, information is part of knowledge; and knowledge is information in action. Finally, the interviewee reported that his organizational unit had a significant structure, but little used by the organization.

## INTERVIEW 3

The third interviewee, in turn, reported that the organizational unit to which he belonged was responsible for the organization's communication with the market. In this sense, the organizational unit was structured to guarantee the dissemination of pre-defined content during the transfer of products and services to the market, in line with the organization's interests.

The dissemination of information to the market, as highlighted by the interviewee, required several processes. In this sense, there was a macro-process of communication with the market and several related sub-processes, covering aspects of collecting basic information about the target audience, defining what to transfer to the market and the organization's priorities.



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Thus, the organizational unit generated information platforms, which were organized by products. These information platforms were used as inputs for the production of *marketing* materials . They were composed of one or two pages that summarized benefits, description, differences and other additional information about a specific product. It is interesting to note that the benefits were hierarchical by target audience, considering that the same product can have different benefits depending on the audience, even in the context of a single organization.

From one or more interviews or even a debate, the construction of each information platform began. Firstly, it was necessary to identify the target audience for the product. However, this information about the public was commonly not clear and the concepts only began to consolidate as the work developed. Based on the processing of information collected from technical (or production), *marketing* and sales professionals, the organizational unit sought to build an information platform at the operational, tactical and strategic levels.

The evaluation of the use of information derived from the platform was carried out through organizational indicators, measured indirectly through the results of *feedback* at events and market research. The interviewee highlighted that the reason for adopting indirect measures is their value, since they can cost more than the *marketing* itself. He also highlighted that research is a one-off activity and *marketing* is continuous.

The construction of the platform was not described as a formal organizational process. No specific *software* tools were adopted; only a text editor was used to produce the material and the resulting files were organized and stored in directories. On the other hand, the process of building information platforms was



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based on the *enhanced Telecom Operations Map (eTOM)*<sup>32</sup> model as well as on the theory on the creation of organizational knowledge by *Nonaka and Takeuchi*.<sup>29</sup>

The interviewee considered the information platform as an extract of organizational knowledge. *Therefore, marketing* communication appropriated this knowledge originating not only from the *marketing* area , but also from the sales area and other groups in the organization. The table presents a Abstract of the results obtained through the interviews.

## DISCUSSION

From the results obtained, it was possible to verify the existence of good practices, as well as points of difficulty in the production and dissemination of information, within the organizational units interviewed.

Firstly, it appears that there was clarity, on the part of the organizational units, in defining the problem that should be solved with the support of information. However, with regard to defining informational needs, there was difficulty in identifying the target audience. According to *Vakkari*,<sup>19</sup> it is the definition of the problem that allows the creation of a space not only for solving the problem, but also for determining the informational needs of the activities to be performed. Therefore, it must occur before solving the problem itself. Informational needs, in particular, must be very well defined, covering the way in which information environments are perceived by individuals, highlighting, therefore, the importance of knowing the target audience for which the information is intended.



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It was also possible to observe that the activities of obtaining and distributing information proved to be adequate in relation to informational needs. Such adequacy refers to its potential to satisfactorily meet the information needs of individuals. As highlighted by *Davenport* ,<sup>1</sup> some examples of possible activities aimed at obtaining and distributing information include the selection of internal and external information sources, information filtering, the act of adding value to information, covering contextualization, interpretation, comparison and identification of implications locations, the classification of information and the choice of communication channels for disseminating information. It is also noteworthy that several of these activities can count on the support of ICTs,<sup>10</sup> as verified in the organizational units interviewed.

On the other hand, it is observed that there was no evidence of effectiveness in evaluating the use of information by individuals and, consequently, of the potential of this information to generate knowledge in the organizational context. Effectively evaluating the use of information must allow verification of compliance with the objectives for which the information was designed. Therefore, disseminated information must have a real and positive impact on solving information-dependent problems, meeting identified informational needs. To this end, it is necessary that each individual, belonging to the target audience for whom the information is intended, assimilate the information,<sup>11</sup> incorporating it into their tacit knowledge.<sup>28,29</sup> In this way, through the evaluation of the use of information, the potential of information to promote the creation of knowledge at the organizational level is indirectly evaluated.



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Specifically regarding the difficulties identified (determining the target audience and evaluating the use of information), it is also worth highlighting some possible implications for the process of production and dissemination of information. In the first case, difficulties in determining the target audience may, in some situations, imply a lack of clarity in defining the problem or the context in which the information was requested, as well as in identifying informational needs. Determining the target audience is at the initial stage of the information production and dissemination process, so if it is not carried out properly it can compromise the other activities of the process, resulting in a distorted information product or with a reduced capacity to promote knowledge.

In the second case, difficulties in evaluating information can be seen in situations where the evaluation of the use of information is non-existent or deficient. Despite not directly compromising the final informational product, such aspects prevent the information production and dissemination process from being corrected or improved.

Among the organizational units analyzed, only one had its information production and dissemination activities described as part of a formal organizational process. Two of them, in particular, had their process based on at least one standard or model: CMMI,<sup>31</sup> eTOM,<sup>32</sup> and creation of organizational knowledge by *Nonaka and Takeuchi*.<sup>29</sup> Having a formalized production and dissemination process, or one based on standards or models, does not in itself guarantee that the information meets its objectives, but it allows the sharing and improvement of the process within the same unit or between different organizational units .



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With regard to the use of technologies, all organizational units reported using ICTs as instruments to support the process of production and dissemination of information. These technologies are part of the organization's information system.<sup>13,20,21</sup> Although the use of ICTs varies in intensity, in no case was the process found to be dependent on technologies. Nor were the processes determined by the technological resources used in the organizational units. ICTs were chosen or shaped according to the process of production and dissemination of information, composing hybrid information systems,<sup>1</sup> which normally present the best results. Finally, it is worth highlighting that the organizational units also demonstrated that they consider the information they produce and disseminate to be part of the organization's knowledge.<sup>29</sup> ICTs themselves contribute to the sharing and integration of knowledge,<sup>12</sup> largely through the process of production and dissemination of information. In this sense, such information is perceived not only as a reflection of a portion of organizational knowledge, but also as responsible for the creation of new knowledge.

## CONCLUSION

To conduct the investigations, this study started from a generic model of production and dissemination of information, added to the concept of information assimilation. Thus, it took into account the stages of determining needs, obtaining, distributing, using and assimilating information. It also considered the role of ICTs in this process, as well as the relationship between the production and dissemination of information and organizational knowledge.

In Abstract, it was possible to verify that, in the R&D center, the organizational units demonstrated good practices in defining the problem to be solved, within the





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stage of determining informational needs, and in the stages of obtaining and distributing information. However, in the stage of determining informational needs, there was some difficulty in defining the target audience. Another point of difficulty was evaluating the effectiveness of the use made of information, according to reports from two organizational units.

It is also worth noting that, among the organizational units interviewed, only one had information production and dissemination activities described as a formal process of the organization. ICTs were used appropriately to support the process of production and dissemination of information, notably in the stages of obtaining and distributing information. Furthermore, the organizational units demonstrated that the information they produced and disseminated is part of organizational knowledge, being important in the creation of new knowledge.

The present study aimed to deepen the understanding of the process of production and dissemination of information at the organizational level. Therefore, an organization was chosen that was intensive in information and knowledge and, therefore, representative of the situation addressed. However, it is important to highlight that the results obtained are limited to the organization studied. It is suggested that, in future studies, other similar organizations be analyzed based on the same parameters, as a way of corroborating investigations on the topic.

## **Attachment.** Interview script

1. How would you describe the scope of activities of your organizational unit?
2. Could you indicate a type of informational product (article, manual, patent, folder, etc.) resulting from these activities?



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3. How is this informational product produced and disseminated?
  - Who is the target audience for the information product?
  - How is informational need determined?
  - Are internal and external sources of information used? Which?
  - What is the treatment given to the information (classification, formatting, etc.)?
  - How is information made available to users?
  - Is the use made of the information evaluated? As?
4. Are the activities mentioned part of a formal organizational process?
5. Are the activities based on a standard or model?
6. In one or more stages of the process, are information technology resources used (hardware, software, computer networks, telecommunications systems)?
7. How dependent is the process on information technology?
8. Was the process totally or partially determined by information technology or were the choices of information technology resources made based on the process?
9. Is the information resulting from the process related to organizational knowledge? In what way?

## **Contributions**

*Rodrigo Hipólito Roza* contributed to the conception and design of the study, data collection and analysis and preparation of the original version of the



article. *Raimundo Nonato Macedo dos Santos* contributed to the conception and design of the study, data analysis and review of the final version of the article.

## **Conflict of interest**

The authors declare that there is no conflict of interests.

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