# Analysis of the Governance Maturity of Intangible Assets and Processes as a Tool for Implementing Knowledge Management in a Pharmaceutical Industry

**Jorge Magalhães (1), Adelaide Maria de Souza Antunes (2), Sandro Santos (3)**

**(1)** Instituto de Tecnologia em Fármacos, Farmanguinhos/Fiocruz, Brasil;
Global Health and Tropical Medicine (GHTM),
Instituto de Higiene e Medicina Tropical (IHMT),
Universidade NOVA de Lisboa, Portugal, jorge.magalhaes@fiocruz.br

**(2)** Instituto Nacional de Propriedade Industrial (INPI) e Universidade Federal do Rio de Janeiro (UFRJ), Brasil, adelaide@eq.ufrj.br

**(3)** Instituto de Tecnologia em Fármacos, Farmanguinhos/Fiocruz, Brasil, sandro.santos@fiocruz.br



## Abstract

Information and Knowledge Management is used to improve the performance of companies' innovative activities. Before implementing a management process, organizations must analyze its aspects related to the dynamics of internal knowledge, whether tacit or explicit. Thus, information management for maturity monitoring constitutes a tool capable of enabling and implementing initiatives in a systematic and structured way. They allow us to continually improve the governance of innovation and projects. In this way, this article contributes to improving information management through a maturity level model and with proposals for improvement for acting and sustainability of the strategic governance of its intellectual assets. Interviews conducted based on the model proposed by Batista (2012) but applied in a pharmaceutical company. After identifying the scenario, the relationship between the critical success factors of managing its processes and knowledge innovation was evaluated. With the degree of maturity obtained, it was compared against the "ideal" degrees and a management plan for projects and processes proposed.

**Keywords**: Innovation. Information Management. Knowledge Management. Maturity. Pharmaceutical Industry.

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**Resumo**

A Gestão da Informação e do Conhecimento é usada para melhorar o desempenho das atividades inovativas das empresas. Antes de implementar um processo de gestão, as organizações devem analisar quanto aos seus aspectos relacionados à dinâmica do conhecimento interno, seja tácito ou explícito. Assim, o gerenciamento de informações para um monitoramento da maturidade, constitui uma ferramenta capaz de viabilizar e implementar iniciativas de forma sistemática e estruturada. Elas permitem melhorar continuamente a governabilidade da inovação e projetos. Desta forma, este artigo contribui na melhoria da gestão informacional por meio de um modelo de grau de maturidade e com proposições de melhoria para a tomada de ação e sustentabilidade da governança estratégica de seus ativos intelectuais. Foram realizadas entrevistas a partir do modelo proposto por Batista (2012), porém aplicada em uma empresa farmacêutica. Após identificação do cenário, avaliou-se o relacionamento entre os fatores críticos de sucesso da gestão de seus processos e inovação do conhecimento. Com o grau de maturidade obtido, comparou-se frente os graus "ideais" e foi proposto um plano de gestão dos projetos e processos.

**Palavras-chave**: Inovação. Gestão da Informação. Gestão do Conhecimento. Maturidade. Indústria Farmacêutica.

## 1 Introduction

The 21st century enters the digital, informational era of data and knowledge. This evolution and, therefore, challenge, has demanded the search for competitive advantages in organizations, with new models or effective management tools, so that knowledge is strategically administered and managed and offers these advantages to organizations (MAGALHÃES *ET AL*. 2022; NONAKA; TAKEUCHI 2008). Several areas such as sociology, economics, administration, claim that there has been a transformation in organizational structures and that at the center of it is knowledge. Corporations are expected to be constantly concerned with organizational knowledge, exploring its creation, transfer and use more effectively. (DAVENPORT; DE LONG; BEERS 1998) so that they can consolidate knowledge as a key economic resource and source of competitive advantage (DRUCKER 1993).

In this context, Dodeler (2023) argues that one of the fundamental points of the citizen of the new millennium is the problem of "how to have access to information about the world and how to have the possibility of articulating and organizing them". This questioning is revealed in how to assimilate and transform information into knowledge, especially so that attitudes are taken, and new knowledge is generated.

According Tarapanoff (2006), the intensification of the use of information for strategic purposes in the perception of the user and the market, denotes that the value of an organization incorporates “intangible” aspects, such as brand value, weight of patents generated, capacity for innovation, talent of employees, in focus on executives and their relationships with customers, software, unique processes, organizational designs, and more. It was also noticed that new and better practices and solutions were expected from organizations, new ideas, discovery processes, new insights, something that information cannot provide no matter how well managed it is (DAVENPORT; PRUSAK 1998).

Thoben *et al*. (2002) define Knowledge Management (KM) as “a systemic strategy with the application of measures such as guides, control and promotion of knowledge resources (tangible and intangible) to use knowledge from inside and outside organizations to create new knowledge, promote improvements and innovations”. According to Szezerbicki *et al*. (2006), KM reorganizes and enhances the productivity, innovation, competitiveness, and relationship factors of companies in the field in which they operate. Oliveira *et al*. (2011) understand that the definitions presented in the literature for KM complete each other, having the process as a common point. In this sense, the authors define KM “as a set of processes aimed at creating, storing, disseminating and using knowledge, aligned with business objectives, considering sources of knowledge internal and external to the organization” (OLIVEIRA *ET AL*. 2011 p.12).

Thus, for any initiative involving the adoption or implementation of KM in an organization, there is a need to carry out a prior diagnosis, to know the strengths and weaknesses of the organization, to then direct more effective actions in relation to the KM. Therefore, organizations are advised to assess their degree of maturity, so that they can support the development of a consistent and innovative plan, in addition to justifying the importance of KM practice. To do so, they can use maturity models, in the sense of showing the level of development to indicate points of improvement and evaluate the evolution and progress of organizations (OLIVEIRA *ET AL*. 2011; BATISTA 2012; SOUZA *ET AL*. 2018).

This paper evaluated the informational management as identification of the governance maturity of the intangible assets and processes of a pharmaceutical company, proposing a Plan for

KM. In this context, it should be noted that public pharmaceutical companies follow superior guidelines to carry out their functions, which are essential for society. They are known as official pharmaceutical laboratories, linked directly to the Brazilian Unified Health System (SUS - Brazilian term) (CARTAXO, 2014; SILVA, 2018). This places these companies as an important part of the government strategy adopted. In view of this, it is becoming increasingly necessary to discuss and implement tools that enable alignment between the players involved so that their important role within the health system is fulfilled satisfactorily (SANTOS MARGOTTO, 2022).

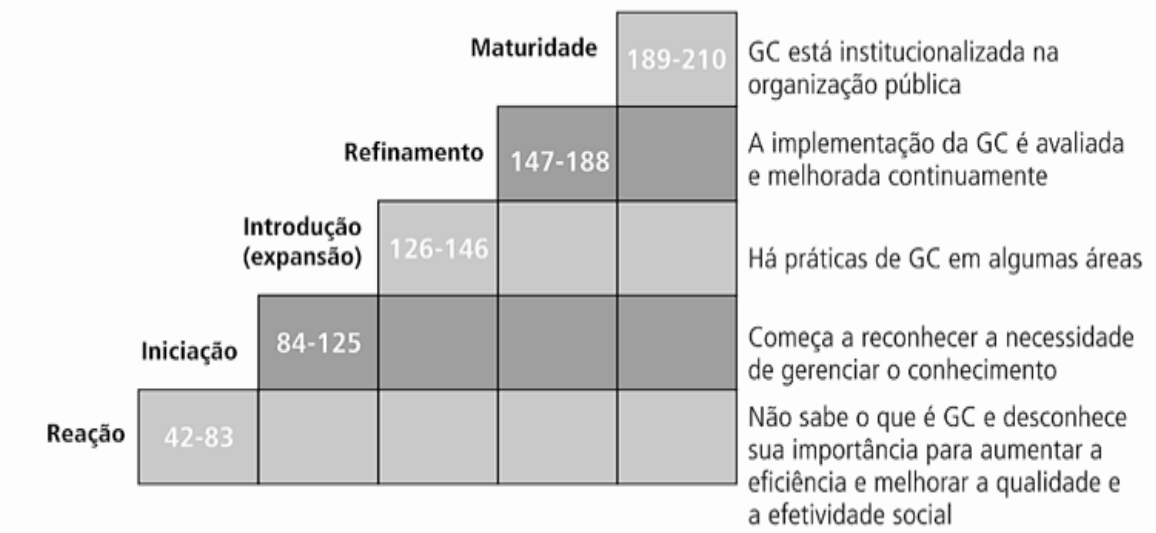
## 2 Methodology

The research had a qualitative approach and presents an exploratory and applied nature. Reference searches were carried out in indexed databases, such as Scielo, Scopus and Web of Science, from 2019 to 2022, in addition to the application of a questionnaire to employees of a Public Pharmaceutical Laboratory, generically referred to here as 'pharmaceutical company'. Authorization from the Research Ethics Committee – Plataforma Brasil, number 51113221.4.0000.5262. A total of 134 interviews were carried out with 43 managers (out of a total of 48) and 91 employees distributed across all areas of the organization. The questionnaire was adapted from Batista's model (2012) – Knowledge Management Model for Brazilian Public Administration – MGCAPB. The subjects' perception of KM was analyzed based on 7 (seven) dimensions: leadership in KM, processes, people, technology, knowledge processes, learning and innovation and KM results. Each evaluated dimension had 6 assertions, totaling 42 (forty-two) for the instrument, which should be scored on a scale of 1 to 5, according to the description: 1 – the actions described are very poorly carried out or are not yet carried out; 2 – the actions described are poorly performed; 3 – the actions described are carried out properly; 4 – the actions described are well performed; 5 – the actions described are very well carried out.

Scoreboards were built from the responses, with five levels of maturity, related to the score obtained. They vary from the “reaction” level (lowest) to the “maturity” level (highest), which shows the result of the evaluation:

I) Reaction: from 42 to 83 points - the organization does not know what KM is and is unaware of its importance to increase efficiency and improve quality and social effectiveness;
II) Initiation: from 84 to 125 points – the organization begins to recognize the need to manage knowledge;
III) Introduction (expansion): from 126 to 146 points – there are KM practices in some isolated areas of the organization;
IV) Refinement: from 147 to 188 points – the implementation of KM is continuously evaluated and improved, for the integration of KM in all areas;
V) Maturity: from 189 to 210 points – the highest level of maturity assessment, where KM is institutionalized in the organization.

Figure 1 – Level of Maturity in Knowledge Management




Source: Batista (2012, p. 95).

## 3 Results and Discussions

Data from the results of the interviews provided a map of the organization's KM maturity level and indicated that the company has an Initiation level, with an average score equal to 105.3 points, on a 210-point scale. This is subdivided into its seven dimensions (see Table 1). Thus, the organization begins to recognize the need to manage knowledge, aware that KM is still at a very incipient level, that is, it is not on its strategic agenda. It should be noted that it was evidenced that there were some KM practices in some areas in isolation. It should be noted that each dimension

is composed of six criteria. Therefore, the maximum score for each dimension is limited to 30 points.

Table 1 – Average score per dimension

| Dimension | Description | Maximum Score | Average score per dimension |
|---|---|---|---|
| 1 | Leadership in KM | 30,0 | 14,5 |
| 2 | Lawsuit | 30,0 | 17,4 |
| 3 | People | 30,0 | 13,7 |
| 4 | Technology | 30,0 | 16,0 |
| 5 | Knowledge Processes | 30,0 | 13,3 |
| 6 | Learning and Innovation | 30,0 | 17,4 |
| 7 | KM Results | 30,0 | 13,0 |
| **SOMA** | | **210,0** | **105,3** |

Source: Authors (2023).

In Table 2, the average scores achieved for each criterion of each of the seven dimensions evaluated are noted. It is noteworthy, as mentioned in the methodology section, that the maximum possible score is 5.0 points for each assertion.

Table 2 - Average score per criterion

| Dimension | Criterion | Description | Average Score |
|---|---|---|---|
| **Leadership in KM** | 1.1 | The organization has KM knowledge, vision and strategy strongly aligned with the organization's vision, mission and strategic objectives. | 2,2 |
| | 1.2 | Organizational arrangements were put in place to formalize KM initiatives (examples: a central information/knowledge management coordination unit; quality improvement teams; COPs; and knowledge networks). | 2,1 |
| | 1.3 | Financial resources are allocated to knowledge management initiatives. | 1,9 |
| | 1.4 | The organization has an information and knowledge protection policy (examples: protection of intellectual property, information and knowledge security and access policy, integrity, authenticity and confidentiality of information). | 3,4 |
| | 1.5 | Senior management and middle management serve as role models in putting the values of knowledge sharing and collaborative work into practice. They spend more time disseminating information to their teams and facilitating the | 2,7 |

| | | | |
|---|---|---|---|
| | | horizontal flow of information between their teams and teams in other departments. | |
| | 1.6 | Senior management and middle management promote, recognize and reward performance improvement, individual and organizational learning, knowledge sharing and knowledge creation and innovation. | 2,5 |
| **Process** | 2.1 | The organization defines its core competencies (strategically important capabilities that give the organization a comparative advantage) and aligns them with its mission and the organization's objectives. | 3,0 |
| | 2.2 | The organization models its main work processes to achieve high institutional performance. | 3,0 |
| | 2.3 | The organization continually evaluates and improves its work processes to achieve better performance, reduce variation, improve products and services, and to keep up to date with management excellence practices. | 3,0 |
| | 2.4 | In process modeling, the following factors are considered: new technologies, knowledge sharing, flexibility, efficiency, effectiveness and social effectiveness. | 2,8 |
| | 2.5 | The organization has its own system to manage crisis situations or unforeseen events that ensures the continuity of operations, prevention and recovery. | 2,7 |
| | 2.6 | The organization continually evaluates and improves its supporting and end-to-end processes to achieve better performance, reduce variation, improve products and services, and to keep up with management excellence practices. | 2,9 |
| **People** | 3.1 | The education and training programs, as well as those for career development, expand the knowledge, skills and capabilities of employees, support the achievement of the organization's objectives and contribute to high organizational performance. | 2,9 |
| | 3.2 | The organization systematically disseminates information about the KM benefits, policy, strategy, plan and tools to new employees in the organization. | 2,3 |
| | 3.3 | The organization has formal mentoring, coaching and tutoring processes. | 1,7 |
| | 3.4 | The organization has a bank of competences of its employees. | 1,9 |
| | 3.5 | Collaboration and knowledge sharing are actively recognized and rewarded/corrected. | 2,1 |
| | 3.6 | The organization of work contemplates the formation of small teams/groups (example: working groups, committees, quality circles, work process improvement teams, cross-functional teams, interdepartmental teams, COPs) and the structure by processes to address concerns and problems in the workplace. | 2,9 |
| **Technology** | 4.1 | The IT Department has the technology and IT infrastructure necessary for the effective implementation of KM. | 3,4 |
| | 4.2 | The organization portal is used as the main source of communication in the IT Department and supports the transfer and sharing of information. | 3,2 |

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|---|---|---|---|
| | 4.3 | The IT Department's IT infrastructure is aligned with the organization's KM strategy. | 2,3 |
| | 4.4 | The IT Department has an efficient and effective IT architecture, as well as KM systems, which support the entire organization. | 2,4 |
| | 4.5 | Existing systems are continuously improved and IT and KM are perceived in the IT Department as interdependent and irreplaceable. | 2,2 |
| | 4.6 | The IT architecture is capable of extrapolating the organization's boundaries, making it possible to share not only data and information, but the knowledge and experience of employees with all the organization's stakeholders in its value chain. | 2,4 |
| **Knowledge Processes** | 5.1 | The organization has systematic processes for identifying, creating, storing, sharing and using knowledge. | 2,3 |
| | 5.2 | The organization has a knowledge map and distributes the knowledge assets or resources throughout the organization. | 1,9 |
| | 5.3 | The knowledge gained after performing tasks and completing projects is recorded and shared. | 2,5 |
| | 5.4 | Essential knowledge of public servants leaving the organization is retained. | 2,0 |
| | 5.5 | The organization shares best practices and lessons learned across the organization so there is not constant “reinventing the wheel” and rework. | 2,2 |
| | 5.6 | Benchmarking activities are carried out inside and outside the organization, the results are used to improve organizational performance and create new knowledge. | 2,5 |
| **Learning and Innovation** | 6.1 | The organization articulates and continually reinforces learning and innovation as values. | 2,9 |
| | 6.2 | The organization considers taking risks or making mistakes as learning opportunities as long as it does not happen repeatedly. | 2,7 |
| | 6.3 | Cross-functional teams are formed to solve problems or deal with worrisome situations that occur in different management units of the organization. | 2,7 |
| | 6.4 | People feel that they are given autonomy by their superiors and that their ideas and contributions are generally valued by the organization. | 2,9 |
| | 6.5 | Middle managers are willing to use new tools and methods. | 3,2 |
| | 6.6 | People are encouraged to work together with others and share information. | 3,0 |
| **KM Results** | 7.1 | The organization has a successful track record of implementing KM and other change initiatives that can be proven with performance indicator results. | 2,1 |
| | 7.2 | Indicators are used to assess the impact of KM contributions and initiatives on the organization's results. | 1,9 |
| | 7.3 | The organization improved – thanks to GC's contributions and initiatives – the results related to the quality indicators of products and services. | 2,4 |
| | 7.4 | The organization improved – thanks to GC's contributions and initiatives – the results related to efficiency indicators. | 2,2 |

| | | | |
|---|---|---|---|
| | 7.5 | The organization improved – thanks to GC's contributions and initiatives – the results related to social effectiveness indicators. | 2,2 |
| | 7.6 | The organization improved – thanks to GC's contributions and initiatives – the results of the legality, impersonality, publicity, morality and development indicators. | 2,2 |

Source: Authors (2023).

Thus, before assessing the degree of maturity in KM in its dimensions and criteria, strengths and opportunities for improvement were identified with a view to implementing KM. Fonseca (2006 apud BATISTA 2012), states that the organization's recognition of its strengths and weaknesses (in this case the opportunities for improvement) enables it to direct its KM efforts in the search for differentiation. In view of this, Frame 3 will present a matrix with the strengths and opportunities for improvement of KM in the pharmaceutical laboratory identified from the perception of the respondents through the evaluation tool.

Frame 3 – Matrix of strengths and opportunities for improvement

| Dimension | Strengths | Opportunities for improvement |
|---|---|---|
| **Leadership in KM** | Information and knowledge protection policy, covering patents and knowledge security | The absence of strategic direction for KM. GC without alignment with organizational strategy |
| | | The absence of organizational arrangements such as communities of practice and knowledge networks |
| | | The absence of a central knowledge management coordination unit |
| | | Low allocation (insufficient) of financial resources in KM initiatives |
| | | Need to improve practices for sharing knowledge and collaborative work |
| | | Senior management and middle management need to evolve concerning promotion, recognition and reward for improved performance, individual and organizational learning, knowledge sharing and knowledge creation and innovation |
| **Process** | There is concern and effort on the part of the organization to establish processes ~~in order~~ to continuously improve | The institution has systematic processes, however, they are more focused on the operational level than on strategic objectives and KM |
| | Process improvement is well established within the scope of Quality Management and Good Manufacturing Practices | In general, process modeling is already done, but evaluation and monitoring are not adequate |

| | | |
|---|---|---|
| | | Process modeling does not include new technologies, knowledge sharing, flexibility, efficiency, efficacy and social effectiveness |
| | | Existing processes maintain operations but do not allow for problem prevention |
| **People** | Differentiated education program | There is no induction process for new employees to become familiar with KM |
| | There is a practice of forming teams/groups to solve specific issues | There are no formal mentoring, coaching or tutoring processes |
| | | No skill bank |
| | | Lack of incentives for sharing and collaboration |
| **Technology** | The organization has adequate IT infrastructure (internet, intranet, website and software) | The IT infrastructure is not aligned with the strategy, as there is no KM strategy |
| | Employees have access to a computer, e-mail account and internet and intranet access, as well as tools and software to assist in carrying out activities | There is no GC system. Therefore, there is no interdependence between IT and KM |
| **Knowledge Processes** | There are systematic processes for identifying, creating, storing, sharing and using knowledge in the Quality System | As there is no proper knowledge management system, the cycle of identification, creation, storage, sharing and use of knowledge occurs only in the Quality System |
| | | There is no knowledge map with the necessary detail to distribute knowledge assets or resources across the organization |
| | | The organizational culture does not favor the sharing of knowledge acquired after performing tasks and completing projects |
| | | KM's systematic processes are seen as insufficient to provide knowledge transfer |
| | | There are no formal processes for retaining knowledge during employee termination |
| | | Sharing of best practices and lessons learned is done sporadically. It is not an institutionalized practice |
| | | The practice of benchmarking is not institutionalized. When they occur, they are isolated and informal initiatives |
| | | The institution does not have an inventory to identify and locate knowledge resources, thus making collaboration difficult. |
| **Learning and Innovation** | The organization articulates and continually reinforces learning and innovation as values in an appropriate manner | The formation of cross-functional teams can be better explored |
| | In general, mistakes are perceived as a form of learning | There is asymmetry about the willingness of middle managers to use new tools and methods |

| | | |
|---|---|---|
| | There is autonomy to undertake ideas within a rationale logic | Although efforts are made to encourage teamwork and information sharing, there is still a culture of knowledge retention. |
| **KM Results** | The organization has some institutional indicators | The indicators are not related to initiatives aimed at knowledge management |
| | The organization is recognized by customers and partners | |

Source: Authors (2023).

Frame 4 presents the proposals to be worked on for improvement opportunities to achieve a Knowledge Management Plan (KMP).

Frame 4 – Matrix of improvement opportunities and proposals

| Opportunities for improvement | Proposals |
|---|---|
| **OM1** - Lack of strategic direction for KM. KM not aligned with organizational strategy | **P1** - Define and present the KM vision and strategies that must be aligned with the organization's strategic drivers |
| **OM2** - Lack of organizational arrangements such as communities of practice and knowledge networks | **P2** - Establishing organizational arrangements to formalize KM initiatives |
| **OM3** - Senior management and middle management need to evolve when it comes to promotion, recognition and reward for improved performance, individual and organizational learning, knowledge sharing and the creation of knowledge and innovation | **P3** - Establish a system of recognition and reward for improved performance, individual learning and the creation of knowledge and innovation |
| **OM4** - There is asymmetry regarding the willingness of middle managers to use new tools and methods | **P4** – Seeking to mitigate asymmetry by raising awareness and changing the culture |
| **OM5** - Absence of a central knowledge management coordination unit | **P5** - Establishing the governance structure |
| **OM6** - Low allocation (insufficiency) of financial resources to KM initiatives | **P6** - Allocate financial resources to enable KM initiatives and ensure the use of KM to improve processes, products and services |
| **OM7** - The institution has systematic processes, but they are more focused on the operational level than on strategic objectives and KM | **P7** - Modeling processes to add value to the citizen-user and achieve high institutional performance |
| **OM8** - In general, process modeling is already done, but evaluation and follow-up are not adequate | **P8** - Continuously evaluate and improve the processes modeled to improve performance and improve products and services |
| **OM9** - Process modeling does not take into account the factors of new technologies, knowledge sharing, flexibility, efficiency, efficacy and social effectiveness | **P9** - Bringing together the factors of new technologies, knowledge sharing, flexibility, efficiency and social effectiveness |
| **OM10** - Existing processes maintain operations, but do not allow for the prevention of problems | **P10** - Adopt an organized system to manage crisis situations or unforeseen events to ensure continuity of operations, prevention and correction |
| **OM11** - As there is no proper knowledge management system, the cycle of identifying, creating, storing, sharing and using knowledge only takes place in the Quality | **P11** – Implement the Knowledge Management Plan to make the KM cycle work |

| | |
|---|---|
| System | |
| **OM12** - Systematic KM processes are seen as insufficient for knowledge transfer | **P12** – Implement the Knowledge Management Plan with the definition of KM practices and processes |
| **OM13** - There is no inventory in the institution to identify and locate knowledge resources, thus hindering collaboration | **P13** – Implement a knowledge inventory tool |
| **OM14** - There is no induction process for new employees to familiarize themselves with KM | **P14** - Systematically disseminate information about the benefits, policy, strategy, model, plan and KM tools to new employees so that they can quickly join the effort to institutionalize KM |
| **OM15** - There are no formal mentoring, coaching or tutoring processes | **P15** - Establish mentoring, coaching and tutoring processes |
| **OM16** - There is no skills bank | **P16** - Implement an organizational skills bank |
| **OM17** - There are no formal processes for retaining knowledge during employee dismissal | **P17** – Define and apply formal processes to retain employees' knowledge |
| **OM18** - There is no knowledge map with the necessary detail to distribute knowledge assets or resources throughout the organization | **P18** - Define and build graphical representations of knowledge so that they can be a tool to support KM |
| **OM19** - The practice of benchmarking is not institutionalized. When they do occur, they are isolated and informal initiatives | **P19** - Institutionalize the practice of benchmarking |
| **OM20** - Lack of incentives for sharing and collaboration | **P20** – Define and apply practices to encourage sharing and collaboration |
| **OM21** - The formation of cross-functional teams can be better exploited | **P21** – Establish institutional practices for teamwork |
| **OM22** - Need to improve practices for sharing knowledge and collaborative work | **P22** - Improve knowledge sharing and collaborative work practices |
| **OM23** - The organizational culture is not conducive to sharing the knowledge acquired after the execution of tasks and the completion of projects | **P23** – Seek to establish a culture of sharing |
| **OM24** - Although we try to encourage working together and sharing information, there is still a culture of withholding knowledge | |
| **OM25** - Best practices and lessons learned are shared sporadically. It is not an institutionalized practice | **P25** – Instituting storytelling and lessons learned practices |
| **OM26** - The IT infrastructure is not aligned with the strategy, since there is no KM strategy | **P26** - To do this, it is first necessary to define and align the institutional strategy with a KM strategy |
| **OM27** - There is no KM system. So there is no interdependence between IT and KM | **P27** - Implement a KM system, after aligning the institutional strategy with a KM strategy |
| **OM28** - The indicators are not related to KM initiatives | **P28** – Define indicators associated with KM |

Source: Authors (2023).

With these results, a Knowledge Management Plan (KMP) was drawn up with the Critical Success Factors (CSFs) for KM (frame 5 and 6). For Damodaran and Olphert (2000), the identification of CSFs serves as the basis for a change management process, including the development of the knowledge-sharing culture necessary for effective KM. Wong (2005) points out the need for organizations to be aware of which CSFs could influence and impact on the

implementation of KM. According to Besen (2013), there is no single set of CSFs for private or public organizations. However, Gnecco Jr. et al. (2010) argue that although there is a wide variety of CSFs, there is a set of fundamental factors which, when perfectly executed, contribute to the success of organizations, otherwise they can lead to failure.

Corrêa and Carvalho (2019) established 13 essential topics for the success of KM, which must be worked together to achieve successful knowledge management (see Frame 5).

Frame 5 - Critical Success Factors

| Critical Success Factor | Description |
|---|---|
| Strategy | The strategy must be clearly drawn up, well-defined and made clear to employees so that they understand the objectives pursued by KM. In addition, this strategy must be aligned with the organizational strategy to support its objectives |
| Leadership and support from top management | The support of senior management acts as a pillar for the continuity of KM. The leader's attitude must serve as an example to other team members, demonstrating a real interest in continuous learning and sharing knowledge |
| Knowledge management team | It consists of a specific team geared towards promoting KM. This team has specific roles and responsibilities, such as establishing processes, coordinating, managing and defining the objective of the KM proposal |
| Resources (financial, human, material and time) | KM requires financial resources for specific technological systems, people to run them, material and infrastructure inputs, as well as time for professionals to carry out CG processes and activities |
| Processes and activities | They are at the heart of KM because they show how organizational knowledge is handled and must be integrated into the workflow in a clear, structured and systematic way. Identification, creation, storage and sharing are some of the processes and activities also known as phases adopted in frameworks, usually in a non-linear way |
| Human resources management | People are the key element in KM, which makes human resource management essential as it works with these individuals who hold knowledge. Thus, the processes of recruiting, developing and retaining employees provide the organization with employees with relevant knowledge and are therefore vital to the success of KM |
| Training and education | Employees must be trained and educated to understand the terminology and objectives of KM, their responsibilities towards this initiative and other aspects such as knowledge sharing, collaborative behavior and the use of knowledge-oriented tools |
| Motivation | These are ways of encouraging employees to get involved, share their knowledge and act collaboratively with KM. Some incentives are rewards (financial), bonuses (non-financial benefits) and employee recognition |
| Teamwork | A team can be interpreted as the coming together of two or more individuals who interact and influence each other. Being in a team boosts cooperation between people and increases the success of KM processes and activities. In this way, work teams are beneficial to the creation and sharing of organizational knowledge |
| Culture | These are the values, norms and social customs that shape the way people behave. |

| | |
|---|---|
| | For KM, a favorable culture must foster the sharing of knowledge, among other aspects that govern a knowledge-oriented atmosphere |
| Information technology | From one perspective, information technology connects people to share tacit knowledge. From another perspective, it allows explicit knowledge to be stored and shared within the organization through the use of databases, intranets and the internet |
| Measurement | It aims to measure knowledge in order to assess the progress and continuous improvement of the KM program, resulting in the need to set measurable targets. One instrument is diagnostics, which tends to measure aspects in order to identify gaps to be remedied through knowledge management |
| Pilot project | They are a way of putting KM into practice on a smaller institutional scale to capture mistakes and lessons learned, increasing the success of an initiative when applied more widely |

Source: Created by the authors (Adapted from Corrêa and Carvalho, 2019).

Connecting the 13 (thirteen) CSF with the Opportunities for Improvement (OI), the stage in which the organization is found is identified and the proposal for the Knowledge Management Plan (KMP) is listed (Frame 6).

Frame 6 – Critical Success Factors **x** Improvement Opportunities x Management Proposals

| **Critical Success Factors** | **Improvement Opportunities** | **Management Proposals** |
|---|---|---|
| **CSF1 - Strategy** | Absence of strategic direction for KM. KM without alignment with organizational strategy | Define and present the KM vision and strategies that must be aligned with the organization's strategic drivers |
| | Absence of organizational arrangements such as communities of practice and knowledge networks | Establish organizational arrangements to formalize KM initiatives |
| **CSF2 - Top management leadership and support** | Senior management and middle management need to evolve in terms of promotion, recognition and reward for improved performance, individual and organizational learning, knowledge sharing and knowledge creation and innovation | Institute a system of recognition and reward for performance improvement, individual learning, and the creation of knowledge and innovation |
| | There is asymmetry in relation to the willingness of middle managers to use new tools and methods | Seek to mitigate asymmetry through awareness and cultural change |
| **CSF3 - Knowledge Management Team** | Absence of a central knowledge management coordination unit | Establish the governance structure |
| **CSF4 - Resources (financial, human, material and time)** | Low allocation (insufficient) of financial resources in KM initiatives | Allocate financial resources to enable KM initiatives and ensure the use of KM to improve processes, products and services |

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| **CSF5 – Process and Activities** | The institution has systematic processes; however, they are more focused on the operational level than on strategic objectives and KM | Model processes to add value to the citizen-user and achieve high institutional performance |
| | In general, process modeling is already done, but evaluation and monitoring are not adequate | Continuously evaluate and improve modeled processes to improve performance and improve products and services |
| | Process modeling does not include new technologies, knowledge sharing, flexibility, efficiency, efficacy and social effectiveness | Aggregate the factors new technologies, knowledge sharing, flexibility, efficiency and social effectiveness |
| | Existing processes maintain operations but do not allow for problem prevention | Adopt an organized system to manage crisis situations or unforeseen events to ensure continuity of operations, prevention and correction |
| | As there is no proper knowledge management system, the cycle of identification, creation, storage, sharing and use of knowledge occurs only in the Quality System | Implement the Knowledge Management Plan to make the KM cycle work |
| | KM's systematic processes are seen as insufficient to provide knowledge transfer | Implement the Knowledge Management Plan with the definition of KM practices and processes |
| | The institution does not have an inventory to identify and locate knowledge resources, thus making collaboration difficult. | Implement a knowledge inventory tool |
| **CSF6 - People management** | There is no induction process for new employees to become familiar with KM | Systematically disseminate information about KM benefits, policy, strategy, model, plan and tools to new employees so that they can quickly join the effort to institutionalize KM |
| | There are no formal mentoring, coaching or tutoring processes | Institute mentoring, coaching and tutoring processes |
| | No skill bank | Implement organizational skills bank |
| | There are no formal processes for retaining knowledge during employee termination | Define and apply formal processes to retain employee knowledge |
| | There is no knowledge map with the necessary detail to distribute knowledge assets or resources across the organization | Define and build graphical representations of knowledge so that they can be a tool to support KM |
| **CSF7 - training and education** | The practice of benchmarking is not institutionalized. When they occur, they are isolated and informal initiatives | Institutionalize the practice of benchmarking |
| **CSF8 - Motivation** | Lack of incentives for sharing and collaboration | Define and apply practices to encourage sharing and collaboration |
| **CSF9 - Team work** | The formation of cross-functional teams can be better explored | Establish institutional practices for teamwork |
| | Need to improve practices for sharing knowledge and collaborative work | Improve knowledge sharing and collaborative work practices |
| **CSF10 - Culture** | The organizational culture does not favor the sharing of knowledge acquired after performing tasks and completing projects | Seek to establish a culture focused on sharing |
| | Although efforts are made to encourage teamwork and information sharing, there is still a culture of knowledge retention. | Seek to establish a culture focused on sharing |

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| | Sharing of best practices and lessons learned is done sporadically. It is not an institutionalized practice | Institute practices of narratives and lessons learned |
| **CSF11 - Information Technology** | The IT infrastructure is not aligned with the strategy, as there is no KM strategy | To address this aspect, it is first necessary to define and align the institutional strategy with a KM strategy |
| | There is no GC system. Therefore, there is no interdependence between IT and GC | Implement a KM system, after aligning the institutional strategy with a KM strategy |
| **CSF12 - Measurement** | Indicators are not related to KM initiatives | Define indicators associated with KM |

Source: Authors (2023).

Thus, by recognizing the relationship between the critical success factors and their respective opportunities for improvement, it was possible to propose practices capable of leveraging the benefits of KM. With this diagnosis, the next step will be to plan the implementation of the proposals with a view to establishing a KM process that integrates the various business processes.

Hence, the results of the assessment determine the degree of use of KM in the organization, the conditions for implementing, and maintaining KM processes. In addition to identifying strengths and opportunities for improvement. In this way, the identification and recognition of the KM maturity level of a public organization becomes a stimulus to improve the techniques used, and advance in the process of institutionalization of organizational knowledge. A big opportunity to the continuous improvement of processes that guarantee better results, efficiency, and quality of the services provided.

The results obtained in the interviews provide a view of the maturity level of the organization's knowledge management, namely: variation from the "Reaction" level as the lowest level, to the "Maturity" level - the highest level. Regarding the dimensions evaluated, they were Leadership, the Processes, the Persons, Technology, Knowledge Processes, Learning and Innovation and, Knowledge Management Results.

The Knowledge Management Results dimension assesses the organization's history in the implementation/implementation of knowledge management and whether indicators are used to assess the contributions of knowledge management in the organization's results (APO, 2009). Therefore, it refers to the outputs of a GC carried out strategically or, even, considering isolated

initiatives that are in a GC scope, even if not yet carried out in a strategic way. The score for this dimension is placed in Table 9 and indicates the lowest score among all dimensions. Bearing in mind the peculiarity of this dimension as it deals with KM Results, the result obtained shows consistency with the results of the previous dimensions.

## 4 Conclusions

The Public Pharmaceutical Laboratories is a strategic institution for the Unified Health System in Brazil. Has public production or public-private arrangements, the expansion and qualification of access to medicines and other health technologies. This public pharmaceutical industry has complexity and specific characteristics, as it encompasses the production of medicines, scientific research, technological development, and education as activities, forming an integrated chain aimed at fulfilling its institutional mission within the Brazilian health system.

The generation of informational data is imperative for effective monitoring of maturity, since it constitutes a tool capable of enabling and implementing initiatives in a systematic and structured way. In this way, the work was structured since informational variables and presented a model adapted from Batista (2012) let them contemplate pillars in the human, technological, procedural, and contextual spheres.

The results showed that the laboratory's maturity in Knowledge Management is at the initiation level, with an average score equal to 105.3 points, on a 210-point scale (subdivided into the 7 (seven) dimensions of the assessment instrument). Therefore, according to the scales of this instrument, the organization is beginning to recognize the need to manage knowledge. Therefore, it was evidenced that there are some KM practices in some areas in isolation.

The existence of initiatives to share knowledge was evidenced, but it was not observed that they do not occur strategically. There isn't even a specific area to instrument the GC. Since there is a direct correlation between this alignment ~~so that~~ several other aspects are institutionalized in a strategically planned way. Thus, the lack of a formal KM strategy negatively impacts, for example, the allocation of financial resources in KM-related initiatives, the implementation of a

KM coordination unit, the establishment of organizational arrangements aimed at knowledge sharing and the implementation of IT tools focused on KM. Furthermore, as there is no KM strategy, the cycle of identification, creation, storage, sharing and use of knowledge is impaired.

It is recommended as the first aspect to work on, the definition of the vision and knowledge management strategies. These must be aligned with the organization's strategic guidelines. Consequently, the governance structure for KM should also be established, as well as defining which organizational arrangements will be used to formalize the initiatives.

Efforts must be made to institutionalize KM, in addition to which the organization must understand the benefits arising from allocating financial resources in KM, as an investment and not as costs, since these have the potential to generate competitive advantages and innovations.

The proposed practices aim to systematize the absorption of knowledge in processes and people, seeking to favor the generation of new knowledge with a view to sustainability, competitiveness and innovation. They refer to practices for acquiring, storing, distributing, and using knowledge. In this context, the implementation of the KM plan will provide benefits throughout this chain, that is, from dedication to research and technological development of high added value and/or strategic drugs for the Ministry of Health, to the production and guarantee of population to access these drugs through the Brazilian Health System.

The application of the proposed methodology can be used in other organizational contexts and, thus, can contribute to the success of other organizations.

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