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IMPLEMENTATION OF KNOWLEDGE MANAGEMENT SYSTEM (KMS) IN PROJECT BASED ORGANIZATIONS (PBO) OF PUBLIC ADMINISTRATION

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ABSTRACT

In the current era of privatization, liberalization, globalization and digital transformation, knowledge management (KM) is no longer an option for public administration, it is an imperative necessity. Public organizations are under strong pressure to improve the effectiveness of their services through their responsiveness, performance, integrity and transparency, as well as their accountability and innovation. Furthermore, many of the public sector organizations are project management oriented, generating more challenging situations due to the temporality and uniqueness of the projects. The results have shown that KM processes can improve all three performance pillars in public organizations. However, despite the significant number of available KM models, there are few that prescribe how to implement KM. This number is drastically reduced to the public sector. For PBO of public administration, there is a gap in the literature. Therefore, the aim of the study was to identify the most appropriate KM implementation model for PBO of public administration. For this, the research was supported by an integrative literature review, in order to identify experimental and theoretical studies, methods and models and to compare and evaluate its characteristics, components and methodologies. The study concludes that the most suitable model is the APO KM Framework.

INTRODUCTION

In the current era of privatization, liberalization, globalization and digital transformation, knowledge management (KM) programs are no longer an option for the public sector, but an imperative necessity. Public sector organizations are under strong pressure to improve their services through responsiveness, performance, integrity and transparency, as well as their accountability and innovation through partnerships with the private sector and other financial institutions (Luen; Al-Hawamdeh , 2001; Cong; Pandya, 2003; Al-Khouri, 2014; Ali ska *et al*., 2018; Balasubramanian; Al-Ahbabi; Sreejith, 2019). The results have shown that KM processes can improve all three performance pillars in public sector organizations: innovation, quality of service provision and operational efficiency of services (Cong; Pandya, 2003; APO, 2013). This should motivate all public sector organizations to implement KM processes (Balasubramanian; Al-Ahbabi; Sreejith, 2019). Furthermore, citizens now expect the same levels and standards of service they receive from the private sector. Many of the public sector organizations are project management oriented, generating more challenging situations for KM due to the temporality and uniqueness of projects (Julian, 2008; Hanisch *et al*., 2009; Shinoda; Maximiano; Sbragia, 2015). These organizations participate in several projects that generate relevant knowledge for their development (Arasaki; Steil; Santos, 2017) representing an opportunity to acquire new knowledge for individuals and the

organization (Terzieva; Morabito, 2016) and managing this knowledge is essential to leverage the performance of projects (Pauli; Sell, 2019). Compared to the private sector, the implementation of KM is quite new for the public sector (Friis, 2002; Yao; Kam; Chan, 2007; Laihonen; Mantyla, 2018). Even the relatively limited studies investigating KM in the public sector were largely fragmented and *ad hoc*, researching a subset of isolated issues (Masarro *et al*., 2015), rather than considering all aspects together in a systemic way. Despite the significant number of KM models available in the literature, there are few models or methods for implementing KM. This number is drastically reduced when applicable or specific to the public sector. Specifically for project based public organizations, there is an evident gap in the literature. The aim of the study was to identify in the literature the most appropriate knowledge management implementation model for the context of the public sector and project management, considering the characteristics and particularities of both themes. Therefore, this work intends to answer the following research question "What is the most adequate model to implement a knowledge management system in project based organizations of public administration?".

The article is divided into four sections: theoretical reference, methodological procedures, results and discussion, and final considerations. The first section presents important concepts and elements of KM, KM in public administration and KM in project management. In the subsequent part, the methodological procedure

used in the study is outlined. In the penultimate section, the results are published and analyzed, suggesting at the end the most suitable model for the implementation of KM in PBO of public administration. To conclude the article, although not the object in question, final considerations are made and possible developments of the research are indicated.

METHODS

The research was supported by an integrative literature review, in order to identify experimental and theoretical studies of constructs, methods and models for the implementation of KMS in PBO of public administration. The integrative review allows the researcher to approach the problem they want to appreciate, drawing an overview of their scientific production, so that they can know the evolution of the theme over time and, therefore, visualize possible research opportunities in organizational studies (Botelho; Cunha; Macedo, 2011). According to the authors, the term "integrative" originates from the integration of opinions, concepts or ideas from the research used in the method and allows the inclusion of studies that adopt different methodologies. In fact, integrative review emerged as an alternative to rigorously review and combine studies with different methodologies, for example, experimental and non-experimental design, and to integrate the results. A good integrative review, according to Whitemore and Knafl (2005), presents the state of the art on a topic, contributing to the development of theories. In addition, it has the potential to promote review studies in various areas of knowledge, maintaining the methodological rigor of systematic reviews, allowing the combination of empirical and theoretical literature data that can be directed to the definition of concepts, identification of gaps in the areas of studies, review of theories and methodological analysis of studies on a given context, which was precisely the aim of this study: "to identify in the literature the most appropriate knowledge management implementation model for the context of the public sector and the management of projects, considering the characteristics and particularities of both themes".

To carry out the research, a bibliographic survey was done in November 2020 in the Scopus® and Web of Science® (WoS) databases, databases with a wide range and multidisciplinary nature. The descriptors initially used to search the databases were the following terms in English on the topic: knowledge management system implementation, project based organization and public administration. However, studies were identified that, when referring to the implementation of KMS, used similar terms, such as knowledge management implementation, implementation of knowledge management, knowledge management practices and application of knowledge management. Similar terms were also observed in studies that, when referring to public administration, used expressions such as public sector, governmental organization, public service and public initiative. As there is no consensus in the literature about the terms used to implement KMS and public administration, all the terms mentioned above were used as descriptors. In the case of the term project based organization, it presented only two publications, being necessary its replacement by the more comprehensive term project management. In addition, a gap was identified in the literature that united the three themes of KM, project management and public administration, where KM was sometimes observed in public administration, sometimes KM in project management.

In view of this fact, two surveys were carried out, obtaining two samples of documents which, in the end, were added to compose the portfolio. Using the Boolean operators AND and OR, the search command used in the first search (Sample I) was (("knowledge management system implementation" OR "knowledge management implementation" OR "implementation of knowledge management" OR "knowledge management practices" OR "application of knowledge management") AND ("public administration" OR "public sector" OR "governmental organization" OR "public service" OR "public initiative")). For the second research (Sample II) we used

(("knowledge management system implementation" OR "knowledge management implementation" OR "implementation of knowledge management" OR "knowledge management practices" OR "application of knowledge management") AND ("project management")). As for the number of documents resulting from the searches, in descending order, there is the following for Sample I: Scopus (36 documents) and WoS (13 documents), totaling 49 selected documents. After eliminating repeated files, 32 documents remained for the step of selecting the most relevant documents for the research. This step took place by reading the titles, abstracts and keywords. Of these documents, 17 articles were disregarded because they were not adhering to the research object or because it was not possible to obtain access, resulting in 15 documents for full reading. After reading, all articles had adherent scope, resulting in a final portfolio of 15 articles. Table 1 summarizes the steps described in the first survey.

Table 1. First research (knowledge management in publica dministration)

Data base	Scopus	WoS
Search field	Abstract	AB
Temporal delimitation	No time frame	
Document Type	Scientific articles	
Language	English and Portuguese	
Total documents per base	36	13
Total documents (sum)	49	
Elimination of repeated articles	32	
Final portfolio	15	

Source: Authors (2020).

As for the number of documents resulting from the searches, in descending order, there is the following for Sample II: Scopus (8 documents) and WoS (7 documents), totaling 15 selected documents. After eliminating repeated files, 12 documents remained for the step of selecting the most relevant documents for the research. This step was done by reading the titles, abstracts and keywords. Of these documents, 4 articles were disregarded because they were not adhering to the research object or because it was not possible to obtain access, resulting in 8 documents for full reading. After reading, only 1 article was removed for not having adhering scope, resulting in a final portfolio of 7 articles. Table 2 summarizes the steps described in the second survey.

Table 2. Second survey (knowledge management in project management)

Data base	Scopus	WoS
Search field	Abstract	AB
Temporal delimitation	No time frame	
Document Type	Scientific articles	
Language	English and Portuguese	
Total documents per base	8	7
Total documents (sum)	15	
Elimination of repeated articles	12	
Final portfolio	7	

Source: Authors (2020).

Both surveys had few publications, suggesting that both the KM theme in project management and KM in public organizations are subjects that are still little explored. Table 3 summarizes the steps described in the research considering the sum of the two samples to support the integrative review.

Table 3. Final portfolio

Data base	Scopus	WoS
Search field	Abstract	AB
Temporal delimitation	No time frame	
Document Type	Scientific articles	
Language	English and Portuguese	
Total documents per base	44	20
Total documents (sum)	64	
Elimination of repeated articles	44	
Final portfolio	22	

Source: Authors (2020).

The research was complemented with the inclusion of relevant works, identified in the articles from the integrative literature review. For the management of bibliographic data and materials related to the research, the Zotero® free software was used. The analysis of the obtained data followed the precepts established by Whittemore and Knafl (2005) which consist of ordering, coding, categorizing and summarizing the data in a unified and integrated conclusion about the research problem. The work by Kuriakose *et al.* (2010) was used for morphological analysis and comparison of KM models, where the KM models can be compared according to six criteria: context; applicability; stages; assessment; validation and key areas.

1) Context: refers to the context in which each model was developed. For example, the model may have been developed for a particular industry, or for a particular company, or be generic.
2) Applicability: refers to which entity each model can be applied to. For example: the model can be applied to any company, or only to a certain sector, or to a certain company.
3) Stages: refers to the number of stages/steps/layers/criteria of each model.
4) Evaluation: refers to the indication of a specific methodology for the practical application of the model. It can be classified as objective when the tool is described in the model; subjective, when it describes how the model was applied and its results, but does not present the tool; or, still, it does not indicate anything.
5) Validation: indicates the model's validation methodology, that is, it indicates how it was applied. It could be a case study, for example.
6) Key areas: indicates the key areas used by each model.

Considering that the motivational differences regarding the implementation of a KMS directly interfere in the choice of the most appropriate model for such implementation (Damian *et al.*, 2019), for the selection of the implementation model of a KMS to be suggested for PBO in the sector, three criteria were established:

1) Follow the requirements recommended by ISO 30.401: 2018 – Knowledge Management System – Requirements, to mention: 4.1 Context of the organization; 4.2 Understanding the needs and expectations of stakeholders; 4.3 Determining the scope; 4.4 Knowledge management system; 4.5 Culture of knowledge management; 5.1 Leadership and commitment; 5.2 Policy; 5.3 Roles and responsibilities; 6.1 Actions to face risks and opportunities; 6.2 Knowledge management objectives; 7.1 Resources; 7.2 Competence; 7.3 Awareness; 7.4 Communication; 7.5 Documented information; 8. Operations 9.1 Monitoring, measurement, analysis and evaluation; 9.2 Internal audit; 9.3 Critical analysis of management; 10.1 Non-compliance and corrective action; 10.2 Continuous Improvement.
2) Be applicable in the public sector, as required by Batista (2012): be simple; be practical; clear, objective and contextualized definition of KM for public administration; contemplate the stakeholders of the public administration, especially the citizen and society; have solid theoretical foundation based on systematic literature review on KM models (KM Frameworks) for public administration and on the analysis of models used by public and private organizations; be relevant and useful for entities of the Executive, Judiciary and Legislative powers, at the federal, state and municipal levels, and direct and indirect public administration; have language and content suitable for the public administration; contemplate critical success factors in the implementation of KM; have a hybrid approach, that is, a combination of prescriptive and descriptive approaches; and be accompanied by a KM implementation manual with guidance on how to: i) assess KM based on criteria (critical success factors or enablers); ii) identify strengths and opportunities for improvement in the KM assessment; iii) identify knowledge gaps; iv) define the KM vision and strategy; v) measure the results of the strategy; and vi) prepare, implement and monitor a KM strategic plan that includes KM tools and technologies.
3) Present KM practices from the intra-project and inter-project perspective, according to Shinoda, Maximiano and Sbragia (2015), and PMO functions related to KM, according to Pauli and Sell (2019);

Below is a brief state of the art on KM models, followed by a breakdown and analysis of the 5 most relevant KMS implementation models for the context of this study, which are then compared according to the criteria presented and, finally, the suggestion the most suitable model for a project based organization of public administration based on established objective criteria.

RESULTS AND DISCUSSION

Models help to synthesize something complex and contribute to the simplification and explanation of a theory. In this sense, models help to visualize and understand some phenomena that would be difficult to understand due to their magnitude and complexity (Malavski; Lima; Costa, 2010). There are currently several KM models available in the literature. Many of them, well known and accepted, such as Nonaka and Takeuchi (1995), Skandia Model (Edvinsson, 1997), Choo Model (1998), European Guide to Good Practice in KM Model (CEN, 2004), OKA Method (Fonseca, 2006), APO Model (2020), among others. Heisig (2009) identified and analyzed 160 KM models between 2002 and 2003, based on a research of existing models in relevant publications between 1998 and 2003 with the term "KM" (knowledge management) both in academia, in organizations and in consultancies area of KM in order to verify the differences and similarities between the models. The author suggests that a KM model should contain the following knowledge-oriented activities: identifying, creating, storing, sharing and applying knowledge. As critical success factors, it suggests: human factors (culture, people and leadership); organizational aspects (structure and processes); information technology and process management (strategy and control).

Batista (2012) reviewed 7 proposals, including models, assessment instruments and KM implementation scripts used by public organizations. The objective of the analysis was to identify elements for the construction of a generic, holistic and specific KM model for the Brazilian public administration. Damian *et al.* (2019) performed an analysis of 6 relevant KM implementation models, both in academia and in the context of organizations, in order to analyze the characteristics of each model, and thus identify the most suitable for an incubator of public sector companies. In general, the models differ in their application focus (any company, specific sector or specific company), type (descriptive, prescriptive or hybrid), number of steps and KM processes involved. Despite the significant number of KM models available in the literature, there are few models or methods for implementing KM. Next, 5 relevant models identified in the literature will be presented with a high probability of meeting the research question of this study, which is "What is the most appropriate model to implement a knowledge management system in a project based organization of public administration?"

Knowledge Management Model for the Brazilian Public Administration (MGCAPB): The KM model proposed in the European Guide to Good Practice in KM was produced by a project team that worked closely with the members of the Comité Européen de Normalisation - CEN in the KM area from September 2002 to September 2003. The work it included nine meetings in Brussels, Amsterdam and Berlin, as well as e-mail contributions from the KM researchers network (CEN, 2004). Many later KM models used this model as a reference. For its construction, more than 140 models from all over the world were analyzed, both designed by KM researchers and KM professionals, consultants and KM associations. The study followed a methodology similar to that used by Heisig (2009), where models were collected, categorized and analyzed to identify the elements and aspects that are widely used. A review was also carried out by various experts in the field and KM practitioners

throughout the construction process. The model of European Guide to Good Practice considers three layers as the most important for KM:

- **Business:** must be at the center of any KM initiative and represents the value addition processes of an organization, which typically can include strategic development, innovation and development of products and/or services. These processes represent the organizational context in which critical knowledge, such as knowledge about products and services, customers or technology, is created and applied. Furthermore, these processes become increasingly inter-organizational as organizations network with suppliers, partners and customers;
- **Knowledge activities:** five basic knowledge activities were identified as the most used by organizations in Europe: identify, create, store, share and use. It is noteworthy that such activities were identified by Heisig (2009) between 2002 and 2003. They represent the second layer of the structure forming an integrated process and are carried out in support of broader business processes. Integration and performance within an organization must be supported by the right KM methods and tools;
- **Facilitators:** these represent the third layer and comprise two main categories, called personal knowledge and organizational knowledge, which complement each other. Personal knowledge includes resources such as ambition; skills; behavior; methods, tools and techniques; time management. Organizational knowledge capabilities are those that leaders must establish to facilitate effective knowledge management, such as: mission, vision and strategy; culture; process and organization; measurement; technology and infrastructure.

The European Guide to Good Practice in Knowledge Management provides a unifying guide with examples of good practice for implementing KM in Small and Medium Enterprises (SMEs) across Europe. Its implementation is divided into 5 phases (Establishing a KM project, Current State Assessment, Development, Implementation and Assessment/Sustainability). The Guide summarizes good KM practices across Europe, from the public and private sectors and academia. Since its launch in 2004, it has not been updated and does not consider recent changes in the market and society.

Pawlowski and Bick's Model: The study by Pawlowski and Bick (2012) presents the Global Knowledge Management Framework, which describes components and influencing factors for KM implementation, identifying the key aspects related to knowledge management processes and systems. The proposal is based on a combination of frameworks, including the European Guide to Good Practice in Knowledge Management (CEN, 2004). In addition to guiding development processes, providing a space for solution and success factors for decision makers and implementers, it is also a reference for researchers, as it compares research, providing a set of descriptions as well as influencing aspects the success of KM solutions. The Global Knowledge Management Framework can also be used to guide KM development processes. These processes need a clear and objective planning of activities, as they are essential for success in interorganizational and geographically distributed processes.

Thus, the following steps can be derived from the model:

- **Identify stakeholder context and barriers:** At an early stage, stakeholders in different organizational units and partner organizations are assessed on their KM context and barriers to using and providing KM resources. This assessment is used to identify potential barriers to knowledge sharing;
- **Design knowledge-sharing processes:** A set of processes and activities for knowledge-sharing, as well as cultural aspects, are planned and implemented, taking into account guidelines on process incorporation (in particular for employees). Thus,

knowledge processes serve as guidance to take into account different phases and to connect them to basic work processes;
- **Provide a support infrastructure:** based on barriers, interventions and support tools are planned;
- **Analyze project success:** Assessing project success is essential. KM projects need to show clear evidence that continuous improvements are being achieved. For this, KM indicators are essential.

The model consists of 5 layers. Are they:

- **Processes:** The core of the model encompasses the business processes and denote the main processes of an organization, such as teaching in educational organizations or the development and deployment of software for software companies. Key business processes are supported by knowledge processes that enable knowledge management inside and outside the organization. In the global context, these processes are highly related to external processes with stakeholders that are distributed across the world.
- **Stakeholders and context:** describes the characteristics of stakeholders that can be individuals, organizations or society. Describes the context or environment in which KM takes place. In general, it relates to organizations (organizational culture, strategy) or society (ethnic culture, technological infrastructure, policies). The focus in this category is the analysis of cultural aspects that influence communication, collaboration and coordination of knowledge processes.
- **Knowledge:** describes and characterizes the aspects and elements of knowledge that are shared or needed by the organization. It highlights the issues that must be resolved for KM, as well as the resources needed to do so.
- **Instruments and interventions:** methods and activities to carry out knowledge processes. The main categories are human-oriented instruments and technological instruments.
- **Results:** describe the main results of knowledge processes using some form of assessment and metrics. From a knowledge perspective, it is important to analyze newly generated or used knowledge, as well as measures of knowledge and its impact. The measurement of KM success can be done primarily at a general level or for specific components such as organizational capabilities or knowledge or competency development.

In conclusion, Pawlowski and Bick (2012) state that the model serves as a guideline that provides the path to the solution, but not the solution itself. In particular, the provision of inherent barriers, success factors and recommendations (for example, incorporation of processes or analysis references) is the main added value of the framework.

Knowledge Management Model for the Brazilian Public Administration (MGCAPB)

Batista (2012) developed the MGCAPB from other models, including the APQC and APO, inserting elements relevant to the context of the public sector, resulting in a model composed of six components: i) strategic drivers; ii) enablers; iii) KM processes; iv) KDCA cycle; v) KM results; and vi) interested parties. Each of these components is described below:

- **Strategic drivers:** formed by vision, mission, strategic objectives, strategies and goals. It is essential to align KM with the vision of the future, the institutional mission, strategic objectives and goals, so that KM can serve as an instrument to achieve organizational results;
- **Critical success factors or enablers of KM:** composed of (1) leadership, who presents and reinforces the KM vision, objectives and strategies and establishes the governance structure and institutional arrangements that serve to formalize KM projects; (2) technology, which makes it possible to accelerate KM processes through tools designed to create, store, share and apply knowledge; (3) people,

who capture, create, store, share and apply knowledge; and processes that, systematized and modeled with adequate knowledge, contribute to improving organizational performance; (4) KM process: activity necessary to identify, create, store, share and apply knowledge in a systematic way so that organizational goals can be achieved;

- **KDCA Cycle:** refers to the activities of the KM process that must be performed in order to obtain results such as increasing efficiency and improving quality. The following steps are highlighted: (1) K for Knowledge, where improvement goals and methods to achieve the proposed goals with a focus on knowledge are defined; (2) D for Do (execute), aimed, among other tasks, at education and training activities; (3) C for Check (verify), where the results of the executed tasks are checked; and (4) Action (to act), related to the activities that must be performed so that the organization can take corrective action if the goals have not been achieved;
- **KM results:** which can be (1) immediate, as in the case of learning and innovation that lead to an increase in the individual, team, organization and society's capacity for achievement in identifying, creating, storing, sharing and in the application of knowledge; or (2) end results that are a consequence of immediate results such as increased efficiency; improving quality, among others;
- **Stakeholders:** which are the citizen-user and society. It is necessary to manage knowledge about citizens-users so that the public organization can fulfill its mission and meet the needs and expectations in relation to the services provided, in addition to identifying the needs and expectations of society in general.

The study is pioneering, as it is the first to describe a generic model (designed for all public organizations), holistic (allows a full understanding of KM), with a focus on results (associating KM with efficiency, effectiveness, social effectiveness, economic development and the principles of legality, impersonality, publicity, morality and efficiency) and specific KM for the Brazilian public administration.

Regarding the practical implementation of KM in Brazilian public organizations, the proposed model fills a gap, as it is accompanied by a manual that covers from diagnosis to implementation, whose Knowledge Management Plan (KMP) unfolds into four stages (diagnose , plan, develop and implement) for the implementation of KM in the set of institutions dedicated to the provision of public services and meeting the needs of citizens and the community that make up the State.

Knowledge Management Program Framework by American Productivity and Quality Center (APQC)

In 2003, APQC proposed a method of implementing KM entitled Road Map for Knowledge Management Results. In 2013, ten years after the first version, the model was reformulated and underwent a restructuring in relation to its stages and components. The current model, called the Knowledge Management Program Framework, provides a detailed roadmap to help organizations design, implement and sustain their KM efforts. The framework is based on 25 years of research and implementation of KM best practices and is also available in an interactive format including links to best practices, case examples, and tools and templates to help organizations through every phase of design, implementation and maintenance their efforts on KM. The model is composed of four phases: Call to Action, Develop KM Strategy, Design and Implement KM Capabilities, and Evolve and Maintain. The first phase of the framework, Call to Action, aims to keep people focused and enthusiastic about KM. In this phase, an organization determines what it wants to achieve and what it will get in return for its investment in KM. The act of articulating why the organization needs to improve knowledge flow and potential benefits is a way of thinking about KM in the context of organizational strategy and priorities. This, in turn, helps ensure the executive-level sponsorship needed to make the vision a reality.

The second phase of the framework is where an organization translates its broad vision and knowledge-sharing goals into an action plan. Once you've finalized your KM strategy, the next step is to make that strategy a reality. The KM team must operationalize its implementation plan and put KM tools and approaches in place to start generating business results. Many organizations are tempted to jump straight into this phase, but without developing a clear value proposition and strategy, they are unlikely to end up with focused KM programs that use resources efficiently in pursuit of common business objectives. Once an organization's KM program is up and running, it moves to the Evolve and Maintain phase, which encompasses expansion, maintenance and continuous improvement. A critical element is increasing KM capabilities and approaches, where appropriate. The APQC recommends evaluating progress at important intervals. By pinpointing the areas that show the most improvement and gaps that continue to hold up the program, the assessment results allow KM teams to determine where they should focus their resources for the greatest return on investment.

Asian Productivity Organization (APO) Model

The first published version of the model was in September 2009, based on a 12-month effort by many experts from the Asia region and abroad, based on reference institutions in Europe and the United States in the area of KM, especially in the European Guide to Good Practice in Knowledge Management (CEN, 2004), resulted in the APO Knowledge Management Facilitators' Guide (KMFG). Ten years later, several important developments in KM took place around the world, as well as changes in the way that APO viewed productivity and related issues. As a result of these developments, several aspects of the Framework have been updated. First, the KM framework was improved, including important new elements, such as the value to citizens offered by public organizations and the need for sustainability as well as agility. The revised APO KM Framework model therefore includes the details of these elements. A second point, given the increasing importance of global and regional knowledge economies, in November 2018, the International Organization for Standardization (ISO) published the Knowledge Management Standard ISO 30401. The 2020 edition of the APO follows the first international KM standard and recognizes the growth of the global knowledge economy, a differential compared to other models.

Third, advances in technology, systems and tools now allow industries to operate and manage knowledge in radically new ways. The Fourth Industrial Revolution, also known as Industry 4.0, is underway and has significantly changed the way knowledge is managed and shortened knowledge lifecycles. Fourth, the Japanese government is promoting initiatives and policies to create a smart society with five "walls of challenges and opportunities", known as Society 5.0. The APO took this opportunity to incorporate important elements of Society 5.0 into its model to help member countries manage the transition to a digital society, including recent change management techniques and smart technology applications. The APO model can be applicable in any country and to any organization. The framework is generic enough to be applied in any organization, regardless of whether it is in the public or private sector. APO has tested the APO KM Framework in various organizations, including small and medium enterprises (SMEs), large companies and public sector organizations, including the Framework includes "Value for Citizens" in the results, especially for public sector organizations. The model consists of three levels: i) accelerators; ii) KM process; and iii) results. There are four accelerators: leadership, technology, people and processes. Accelerators help to accelerate the KM initiative in the organization. The KM Process, on the other hand, consists of five steps: identifying, creating, storing, sharing and applying knowledge. The KM process generates learning and innovation for organizations at all levels and, as a result, increases the capacity of individuals, teams, the organization and society. Finally, the results, the third and last component of the KM model, have two levels: The expected results of KM initiatives are the improvement of individual, team and organizational capabilities and the increase in

social capacity. Together, these results will boost overall productivity, improve product and service quality, and contribute to profitability, citizen value, growth and sustainability.

The steps of the APO KM implementation methodology are grouped into 4 steps:

1) Discover: i) assess current status; and ii) create a business case;
2) Design: iii) develop a KM strategy; iv) identify potential programs; v) design processes; and vi) formulate an implementation plan (aligning KM with organizational strategy);
3) Develop: vii) formulate a pilot plan; and viii) conduct an After Action Review; and
4) Implement: ix) implement an organization-wide plan; x) dealing with resistance to KM; xi) develop a communication plan; and xii) continuously evaluate (APO, 2020).

Both the model and the method of implementation are simple, practical and adaptable. APO's KM model is hybrid, as it both describes KM (descriptive) and guides (prescriptive) how to implement KM in organizations. The component that differentiates the APO model is "results", that is, the association between KM and organizational performance (productivity, quality, profitability, growth, sustainability and value for citizens), considering that the other components (accelerators and process of KM) are widely used in the models found in the literature and in the practice of organizations. After the presentation of the KM implementation models, it is possible to develop considerations about the most appropriate model to be used in a project based organization of public administration. For analysis and comparison of KM models, the work by Kuriakose *et al.* (2010), where KM models are morphologically categorized according to six criteria: context; applicability; stages; assessment; validation and key areas. The table below shows the comparison between the models according to the indicated methodology.

clear in the model as in the European Guide to Good GC Practice (5.2, 9.3, 10.1), Pawlowski and Bick (5.1, 5.2, 5.3, 6.1, 7.5, 8, 9.2, 9.3, 10.1), MGCAPB (4.5, 8, 9.1, 9.2, 9.3, 10.1) and APQC (9.2, 9.3 , 10.1). As for being applicable in the public sector, only the MGCAPB model was developed in the specific context for the public sector, the others were developed for the general context, but they are applicable to any organization. The models of the European Guide to Good Practice in Knowledge Management and APO make it clear that they are applicable in the public sector. In addition, Pawlowski and Bick's (2012) model include the term "Society", from MGCAPB, "Citizen - User and Society" and from APO, "Value for Citizens". Regarding the last criterion related to the KM practices presented by the models and which fit the KM practices in the intra-project and inter-project perspective and also commonly related to the functions of PMOs in KM, they were presented by the European Guide to Good Practice in Knowledge Management that would fit in intra-projects (knowledge map, brainstorming, cognitive map, internal benchmarking, external benchmarking), inter-projects (consumer knowledge base, best practices, external partners, workshop, database, document management system, specialist literature, manuals, knowledge fairs, discussion forum, intranet) and PMO (lessons learned, community of practice, knowledge broker). As for Pawlowski and Bick's model, they would fit as intra-project KM practices (mentoring, document management, videoconferencing, messaging, data mining, social network, communication tool), inter-project (job rotation, career planning, development of team, game simulation, knowledge fair) and PMO (knowledge base). By the MGCAPB model, they would fit for intra-project (mentoring, data mining, knowledge map, collaborative virtual environments, brainstorming, internal and external benchmarking, narratives, collaborative physical environments), inter-project (training, coaching, best practices, portals, intranets, extranets, data warehouse, forums, corporate education, electronic document management, corporate university, organizational memory, organizational intelligence system, competency management system, knowledge café, project databases) and PMO (communities of practice, lessons learned, knowledge repositories, intangible asset management).

Table 4. Comparisonbetween KM implementationmodels

#	Model	Year	Context	Applicability	Stages	Assessment	Validation	Key Areas
1	European Guide to Good Practice in KM	2004	General	All	3	Objective	No	Business processes; KM Processes; Enablers.
2	Paulowski and Bick	2012	General	All	5	Objective	No	Context; Stakeholders; Strategies; Processes; Knowledge; Infrastructure; Instruments; Results.
3	MGCAPB	2012	Public Sector	All	6	Objective	Yes	Vision; Mission; Strategic objectives; Strategies; Goals; Enablers; KM Processes; Stakeholders; Results.
4	APQC	2013	General	All	4	Objective	Yes	Continuous Improvement; KM strategy; KM capabilities; Evolve and Maintain; Results.
5	APO	2020	General	All	3	Objective	Yes	Vision; Mission; Accelerators; KM Processes; Results.

Source: Authors (2020).

For the selection of the KM implementation model to be suggested for projected public sector organizations, three criteria were established, namely:

1) Follow the requirements recommended by ISO 30401: 2018 – Knowledge Management System – Requirements;
2) Be applicable in the public sector, as required by Batista (2012);
3) Present KM practices from the intra-project and inter-project perspective, according toShinoda, Maximiano and Sbragia (2015), and PMO functions related to KM, according to Pauli and Sell (2019).

Regarding the first criterion, the only model that claims to follow ISO 30401: 2018 is that of the APO, the main reason being its update in 2020, after the publication of the regulation. Although the latest editions of the other models precede the standard, they meet most of the requirements, either explicitly and/or implicitly, with the exception of some requirements that were not presented or are not

According to the APQC model, they would only fit for intra-project (knowledge map, benchmarking), inter-project (good practices) and PMO (lessons learned, community of practice). For the APO model, they would fit for intra-project (mentoring, internal and external benchmarking, chat rooms, mind map, data mining, yellow pages, audio, video conferences, meeting support software), inter-project (formal training, coaching, exit interview, corporate portal, computer training) and PMO (knowledge repository, community of practice, lessons learned, expert network). In view of the above information, based on the analysis of the criteria for meeting the requirements of the ISO 30.401 - Knowledge Management System - Requirements (ISO, 2018), on the KM model requirements for application in the public sector (Batista, 2012) and presentation in the models of KM practices that would fit the intra-project, inter-project perspective (Shinoda; Maximiano; Sbragia, 2015) and PMO (Pauli; Sell, 2019), it is possible to conclude that the most appropriate model, at this time, for the implementation of an KMS in a projected organization of public administration is the APO KM Framework of the APO (2020). It is hoped that the suggested model can be implemented in public

organizations, more specifically in PBO in public sector, so that the proposal can be validated from case studies and that the success of the KM implementation can be achieved and, thus, making public organizations can enjoy the benefits arising from KM and consequently deliver more value to citizens.

FINAL CONSIDERATIONS

Public sector organizations are under strong pressure to improve their services through responsiveness, performance, integrity and transparency, as well as their accountability and innovation through partnerships with the private sector and other financial institutions (Luen; Al-Hawamdeh , 2001; Cong; Pandya, 2003; Al-Khouri, 2014; Ali ska *et al.*, 2018; Balasubramanian; Al-Ahbabi; Sreejith, 2019). Many of the public organizations are project-oriented, generating even more challenging situations for KM due to the temporality and uniqueness of projects (Julian, 2008; Hanisch *et al.* 2009; Shinoda; Maximiano; Sbragia, 2015). The results of studies in KM have shown many benefits for both public administration and project management. However, for organizations to enjoy the benefits arising from knowledge, it needs to be properly managed (Damian *et al.*, 2019). Unfortunately, as highlighted in this study, there is a lack of research in the literature that unites the three areas and offers a KM model for implementation in PBO in public administration. As a result, the work suggests a model for such an application. Some limitations can be highlighted in the study. Firstly, the documents were obtained only from the Scopus and WoS databases, which could unintentionally ignore some relevant works on KM implementation models in PBO in public administration. Furthermore, this research was based on the analysis and interpretation of results based on established criteria. Other researchers using the same data may present different interpretations and conclusions when adopting other criteria for evaluation.

In terms of originality, this study significantly contributes to the literature by proposing the use of a KM model in PBO in public administration, which was an unprecedented topic. The proposal presented also contributes to academia by strengthening the link between the themes of knowledge management, project management and the public sector. It is hoped that the work can also stimulate discussions and offer insights for advancing research on the subject. The following stand out as possible consequences of this research: the application of the suggested model in a real case study; the development of a specific model for PBO in public sector; and given the digital transformation, especially of e-government, the current scenario requires the development of a KM implementation framework through a dynamic web-based platform that includes all the steps, elements and artifacts for the practical and agile implementation of KM in projected organizations of public administration.

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