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Assessment model for organizational business process maturity with a focus on BPM governance practices

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Abstract

Purpose – The purpose of this paper is to propose an assessment model for process management maturity focussed on business process management (BPM) governance practices.
Design/methodology/approach – This investigation uses case studies.
Findings – The BPM governance elements identified and analysis of the BPM maturity models previously used gave rise to the assessment model for organizational maturity in BPM developed for this study.
Originality/value – The model allowed the authors to diagnose organizations' current situation in terms of process management and provided a preliminary assessment of the next steps in the evolution of maturity for each of the factors analyzed.

Keywords Process management, Management, Process analysis
Paper type Case study

1. Introduction

Any organization, whether from the public or private, needs to coordinate its work so as to forecast its resources and activities, manage them on a daily basis and promote the continuous improvement of its operations (Paim *et al.*, 2009). As described by Müller (2013), a company is a set of interrelated processes, and understanding an organization from this perspective is essential to improving its management. Organizations operate within a complex environment, catering to varying demands from increasingly demanding clients, and tend to offer multiple products and services in different markets. In this context, it is increasingly important for companies to manage their processes effectively.

According to Harrington (1993), a process is any activity that receives an input and using the organization's resources, generates a certain output for an internal or external client. Cruz (2003) provides a similar definition, but emphasizes that processes are essentially actions and are therefore the introduction and processing of raw materials in an environment consisting of procedures, standards and regulations. Through processing, these raw materials are converted into results and delivered to clients. Hammer (2013) reports that processes must be managed as such, benefitting from the expertise of process management. By applying process management, companies ensure that processes are carried out in accordance with established standards and function at the performance level they are capable of offering (de Bruin *et al.*, 2000).

According to de Bruin (2009), business process management (BPM) emerged as a discipline in the 1990s based on the business process reengineering ideas developed by

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Hammer and Davenport. Initially, interest in BPM was justified by the need to develop the ability to respond promptly to client needs, improve the quality of products and services, and adapt to the globalized and highly competitive environment. These needs have recently expanded to include customer satisfaction, cost reduction, coordinated management and adopting information technology to support management (Harmon and Wolf, 2008; Kohlbacher, 2010). However, Kohlbacher (2010) warns that, despite the success achieved through process management, it is still important to understand the different dimensions that constitute it.

Smith and Fingar (2003) report that BPM involves not only identifying, designing and executing business processes, but also their interaction, analysis and optimization. In proposing critical success factors for process management, Trkman (2010) also points out that BPM actions should not be regarded as isolated projects, but rather as a continuous effort by organizations to optimize their processes.

Process management aims to facilitate communication and cooperation, serving as a bridge between strategies, organizational capabilities and daily activities. Nevertheless, acceptance of this management model by organizations demands significant time and effort (Valle and Oliveira, 2012). As such, in order to guide these processes, it is important to discuss how to integrate BPM aspects and responsibilities into a management system (Doebeli *et al.*, 2011). The authors report that it is necessary to establish business process governance to ensure the sustainability of business process practices and efforts.

Thus, despite the benefits of process management, companies are still struggling to evolve and expand BPM practices across the organization, as observed by de Bruin (2009). Among the reasons given for these difficulties are the lack of positive organizational culture, lack of support among senior management, the absence of clear roles and responsibilities in implementing the methodology, and insufficient budget and available resources. These could be avoided if organizations had a higher level of maturity in governance initiatives. Thus, because BPM governance is essential to organizations, there is a need to evaluate its elements using a process management maturity model developed for this purpose.

Based on the above research problem, the general objective of this study is to propose an assessment model for process management maturity focussed on BPM governance practices.

2. Theoretical framework

2.1 BPM governance

According to Rosemann and vom Brocke (2013), interest in BPM is growing, meaning companies applying process management have higher expectations regarding its promised benefits. This requires knowledge of how to approach BPM methodology, which is achieved by compiling a model that guides companies in their actions. These models must be structured to enable a holistic understanding of BPM, that is, as an organizational skill rather than isolated initiatives to improve processes. As such, authors seek elements in BPM maturity models that are vital to their implementation:

- Strategic alignment: interconnection between strategic planning and organizational processes, enabling effective and efficient action to improve company performance. Processes must therefore be designed, executed, managed and measured in accordance with strategic priorities.
- Governance: the definition of roles and responsibilities at different levels of BPM (portfolio, program, project and operation).

- Methods: set of tools and techniques that support process management, facilitating the modeling, analysis and improvement of processes.
- Information technology: the use of information technology supports the modeling, execution and control of processes.
- People: considered by authors as the key element of BPM, since it is individuals or groups that enhance and continuously apply their knowledge and skills to execute and improve processes.
- Culture: BPM culture incorporates the values and beliefs that will turn companies toward process management. As such, it is important to create an environment that favors BPM initiatives.

Based on his experience in different companies, Hammer (2013) addressed the aspects considered enablers for high-performance processes (design, metrics, performers, infrastructure and owners) and observed that not all enterprises are equipped to establish these enablers. This enablers are related to the following organizational capabilities:

- Leadership: the disruption caused by the transition to process management causes significant changes in organizational culture. As such, process management must be supported by experienced senior executives, otherwise it will "run aground on the shoals of inertia and resistance" (Hammer, 2013, pg. 10).
- Culture: processes require people within the organization to focus on customers, work as a team, be accountable for results and willing to accept change. If this is not the organizational culture, there may be many obstacles to implementing process management.
- Governance: the shift to process management and its long-term institutionalization require a set of governance mechanisms that ensure the allocation of responsibilities and integration of processes.
- Expertise: implementing BPM and managing processes can be a complex and high-risk initiative, which calls for the involvement of people with knowledge in design and the implementation of processes, measures, change management and process improvements.

Rosemann and de Bruin (2005) and Hammer (2013) identified similar elements as success factors in BPM implementation. However, Hammer (2013) states that the most prominent of these is governance, since it is responsible for supporting the other elements. In turn, governance must be ensured by a dedicated unit made up of the organization's owners, managers and senior executives, who are responsible for the strategic supervision of process management, establishing guidelines and priorities and acting to integrate procedural problems.

Harmon (2004) defines process governance as the organization of management, establishing goals, principles and organizational charts that determine the decision makers and set the policies and regulations that guide their actions. In the context of process management, Richardson (2006) states that governance creates relevance and transparency in terms of accountability and the decision-making process.

Governance in BPM involves defining responsibilities to ensure the ongoing optimization and management of processes, controlling their performance and encouraging continuous improvement. The function of governance is to develop management practices that increase the likelihood of successful BPM (Spanyi, 2013).

According to Burlton (2013), the application of a governance model allows companies to prioritize process improvements and increase their capabilities, monitor process performance and results, and manage the necessary changes.

2.2 Evolution of BPM in companies

Despite the benefits of process management, companies are still struggling to evolve and expand BPM practices across the organization, as observed by de Bruin (2009). According to the author, this is due to the limited understanding of the methodology by companies, which use it only to make isolated improvements to processes, whereas its broad application across the enterprise would produce better and permanent results. Thus, the author justifies the need for models to assess BPM maturity in companies as a means of diagnosing its application.

As observed by de Bruin (2009) and Rosemann and vom Brocke (2013), most maturity models are based on the capability maturity model (CMM) developed in the 1990s by the Software Engineering Institute (SEI) of Carnegie Mellon University. Examples of maturity models cited by the authors are: the European Foundation for Quality Management Excellence Model, the Rummler-Brache Group Process Maturity Model and the process and Enterprise Maturity Model developed by Hammer (2007).

The CMM classifies companies into five levels depending on the organization of their processes (Paulk *et al.*, 1995):

(1) Level 1: immature organizations. Processes are ad hoc, with no project planning.

(2) Level 2: organizations in which some macro processes are mapped and executed, with some degree of result consistency. However, many processes remain uncontrolled.

(3) Level 3: organizations in which all basic process are defined and have some degree of control. They are also concerned about storing data and using indicators for monitoring purposes.

(4) Level 4: organizations applying process management. Consistent information is stored, the company uses indicators to monitor processes and strives to achieved the established goals. These goals are broken down from macro processes to sub-processes so as to interconnect all actions.

(5) Level 5: organizations that provide training on processes for staff, who are continuously involved in their improvement.

Gonçalves (2000) reports that companies go through several stages of evolution to ultimately achieve process management. The author identifies five stages (A, B, C, D and E), from a purely functional management model to a primarily process management-based model. Companies in stage A are those with no initiatives in place to manage their processes; stage B organizations have identified their processes and sub-processes, but their management is still function-based; businesses classified as stage C are those that still manage functions despite having identified, mapped and optimized some of their processes; stage D enterprises, in addition to fulfilling the requirements of previous stages, also manage their resources to suit their processes; and companies in stage E are structured according to the logic of core processes.

With respect to BPM, de Bruin (2009) states that some early research was important in prompting the measurement of the maturity of its implementation based on indicators

such as time, progress, number of people involved in the initiatives and the budget forecast for implementation. For example, Ittner and Larcker (1997) studied the use of various approaches to BPM and the indicators return on assets and return on sales. In analyzing the results, the authors concluded it was difficult to establish a cause and effect relationship between the approaches studied and company performance results, confirming that external influences and the environmental context can affect results.

De Bruin (2009) also cites research developed by Pritchard and Armistead (1999), who investigated BPM practices in European organizations based on case studies, examining information concerning the progress of BPM and analyzing the differences identified. The authors began by dividing the organizations into five groups, ranging from enterprises that had not implemented BPM to those considered benchmarks in its implementation, using subjective and objective criteria (such as time, investment and best practices adopted). Next, the companies were reorganized into only two groups: those in the initial and advanced stages of BPM implementation, identifying the main differences between them. This made it possible to establish the motivations of each group, the difficulties encountered and perceived success.

Röglinguer *et al.* (2012) and Scheer and Brabänder (2013) report that it is essential to monitor the evolution of BPM implementation in companies. This is one of the duties of BPM Centers of Excellence (CoEs). The authors explain that progress in BPM implementation is measured by maturity models, which identify what stage companies are in and what obstacles must be overcome to reach the next level. As such, the levels (or stages) of these maturity models follow a logical sequence from the initial stage to the last level of BPM implementation (Röglinguer *et al.*, 2012).

Smith and Fingar (2003) and Rosemann and vom Brocke (2013) identified two types of BPM-related models: process maturity models and BPM maturity models. The former refers to the general conditions of processes and the latter involves the evolution of BPM implementation. De Bruin (2009) presents additional sub-divisions, identifying four categories detailed as follows:

(1) generic process maturity models: models used to prioritize and select processes submitted to the BPM improvement cycle;

(2) specific process maturity models: models used to monitor the evolution of specific processes;

(3) generic management maturity models: models that monitor the maturity of companies in managing processes; and

(4) specific BPM maturity models: models that monitor the maturity of companies in applying BPM methodology.

The present study only examines BPM maturity models, which are considered relevant to the achievement of the proposed objectives. Thus, the models presented are those indicated by de Bruin (2009) and Rosemann and vom Brocke (2013) and were selected by the authors because they are the most widely used models.

Fischer (2004) proposes analyzing the evolution of BPM implementation based what he refers to as "states of maturity" and "levels of change." According to the author, broad understanding of BPM requires that the following five levels be aligned:

(1) strategy: strategic understanding of the role, positioning and focus for enterprise-wide decision making in support of overall company objectives;

(2) controls: indicators used to evaluate initiatives and management;

(3) people: human resource environment, including skills, organizational culture and organizational structure;

(4) technologies: information systems used to support BPM implementation; and

(5) processes: operating methods, policies and procedures that determine the way activities are performed.

To assess the maturity of companies at each level, Fischer (2004) identifies the following states of process maturity: siloed, tactically integrated, process driven, optimized enterprise and intelligent operating network. Figure 1 shows the relationship between the states of maturity and levels of change as well as the characteristics of companies in each context.

Hammon (2004) uses the CMM to define five levels to classify organizations according to BPM implementation. However, although this model evaluates the implementation of BPM methodology, the author argues that in order to assess an organization, each of its processes must be analyzed to determine whether they are defined, standardized and managed. The five levels proposed are:

(1) Level 1: processes are ad hoc and few activities are well-defined. Organizational performance is dependent on the individual efforts of staff.

(2) Level 2: some basic projects are carried out to define and improve processes, with the goal of cutting costs and improving performance. Standards are established to ensure process efficiency.

(3) Level 3: organizational processes are defined, documented and standardized, and are monitored by managers.

	Siloed	Tractically Integrated	Process Driven	Optimized Enterprise	Intelligent Operating Network
Strategy	• Reactive to market conditions within 1-2 years, typically chasing a competitor • Integration within functions • Driven by cost and efficiency	• Adapt/react to market dynamics within 12 months • Some cross-functional integration to solve pains • Initial entry into point-to-point integration with partners	• Adapt/react to market dynamics within 3-6 months • Enterprise-wide process leadership is established • The business process is the foundational element of the enterprise	• Adaptive to market dynamics within weeks • Enterprise organized completely around processes • Optimized processes+ execution yield competitive advantage	• Predictive capabilities and market leadership • Continuously adaptive to market dynamics in near real-time • Enterprise and its partners are organized around processes • Competitive advantage is driven and shared by partners
Controls	• Local and functional level authority/autonomy • No enterprise-wide standards or governance • No formal value measurement program	• Hierarchical mgmt. structure • Independent functional department decisions • Limited enterprise-wide standards or governance	• Formal process leadership establishes priorities • Business cases drive projects • Process metrics tied to individual and team performance	• Process teams responsible for overall performance • Relevant process metrics institutionalized as main performance measures	• Inter-enterprise process teams own performance • Relevant process metrics are used to measure bi-directional partner performance
Process	• Static business processes • Functional silos • Geographic silos • Department focussed • Informal communications within departments	• Limited process reengineering and cross-function/process coordination (often manual, one-time efforts) • Systems drive baseline process definitions	• Fully transitioned form functional to process focus, including management structure, execution teams, and performance evaluation • Targeted BPO	• Total process integration across the enterprise • Commitment to continuous process improvement program • Outsource non-core business processes (reduce cost and increase quality)	• Total process integration across the ecosystem • Key processes flow seamlessly across firewalls
People	• Subject matter experts • Culture is adversarial, mutual distrust • No formal change management procedures • I will do my job, you do yours	• Cross-functional/process team members (usually led by IT) • Limited understanding of cross-department process needs and dependencies	• Process leaders define, deploy, enhance, and maintain core processes • Functional teams focus on high quality execution	• Lean organisation focussed on optimizing process definitions and execution • Ongoing process training for employees	• Partner selection includes process and cultural attributes • Ongoing process training for employees and partners
IT	• Independent systems • Islands of automation • Integration only within functions • Legacy enterprise system(s)	• Leverage ERP systems for cross-functional integration • Point-to-point partner integration • IT leads cross-functional initiatives (systems focussed)	• IT supports process leadership team in initiatives • System and instance consolidation to streamline processes and info mgmt.	• Utilize Business Process Management (BPM) solutions to automate process execution, monitoring, and control across the Enterprise	• Utilize BUsiness Process Management (BPM) solutions to automate and monitor process execution throughout the ecosystem

Source: Fischer (2004)

Figure 1. Relationship between the states of maturity and levels of change in BPM

(4) Level 4: information is collected on organizational processes and the resulting products/services and analyzed.

(5) Level 5: organization-wide continuous process improvement based on data collected by a rigorous assessment system with the help of information technology.

According to the author, organizations that progress from the first to the second level are generally motivated by the need to cut costs, standardize procedures and improve the quality of products and services. Moreover, most companies are classified between levels 2 and 3.

Rosemann and de Bruin (2005) compiled a maturity model consisting of factors, process management stages and scope of analysis. The factors analyzed are those considered critical to successful BPM implementation: strategic alignment, culture, people, governance, methods and technology innovation. The proposed stages of processes management were based on the CMM: initial, defined processes, standardized and repeatable processes, managed processes and optimized processes. Scope is related to the context in which the organization is assessed, that is, defining the unit of analysis and time period. Figure 2 shows the relationship between the three components.

The Object Management Group (OMG), an international non-profit consortium aimed at developing management methods and standards for organizations, also developed a business process maturity model. The proposed model consists of five assessment levels, where process management evolves in small steps and through process innovation. These levels are as follows (OMG, 2009):

(1) Level 1: initial stage, where people are motivated to overcome problems and improve their work methods. The goal is to increase efficiency and productivity.

(2) Level 2: work is standardized to enable control. The aim is to reduce the need to redo jobs and increase customer satisfaction.

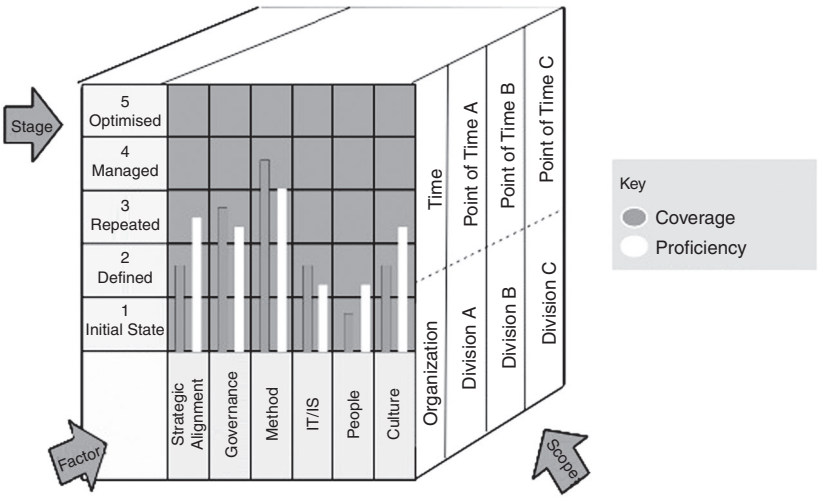

Figure 2.
BPM maturity model

Source: Rosemann and de Bruin (2005)

(3) Level 3: standard processes are developed, indicators are defined and employee training is carried out.

(4) Level 4: processes are stable and managed. There is also concern with knowledge management.

(5) Level 5: companies strive for continuous process improvement and innovation management.

In his research, Spanyi (2013, p. 268) identifies the fact that the methodology appears highly complex to leaders as a limiting factor in the evolution of organizational process management. He points out that the generally complex appearance of maturity models is an aggravating factor, since they encompass different areas of activities identified as fundamental by their authors, which intimidates those seeking to implement the methodology. The author also states that the models should focus primarily on addressing governance initiatives, since they are essential to greater maturity in process management.

The models presented demonstrate that adjustments were made over time in accordance with the evolution of companies' BPM practices. While in early models such as those proposed by Fischer (2004) and Harmon (2004) the first stage considers that none of the company's processes are structured, more recent models, such as those put forward by Rosemann and de Bruin (2005) and the OMG (2009), begin with the assumption that organizations are initially concerned about the efficiency and productivity of their processes. This readjustment is also evident in the presence of innovation management at the highest level of maturity in the OMG model, while in other models maximum maturity can only be achieved through continuous process improvement.

In general, the models aim to identify the key elements of BPM that determine the success of organizations. Determining these elements is vital to gradually achieving excellence in BPM. As such, the following section addresses the governance elements of BPM and how BPM CoE can help organizations achieve them.

3. Proposed assessment model for business process maturity

3.1 Methodological procedures

This investigation uses case studies, whose planning, according to Gil (2010), tends to be more flexible compared to other designs. The set of stages proposed by him is described below:

(1) Conduct a literature review on relevant issues: this is the theoretical foundation and is restricted to the relationship with the work to be conducted.

(2) Propose an assessment model for business process maturity: to meet the objective of this study, a model is recommended to evaluate organizational maturity in BPM. The model is designed based on the characteristics and reference model identified using the theoretical framework.

(3) Plan data collection: stage in which the sources for data collection are defined. In the present study, this took the form of a literature review, described in stage "(b)," and interviews with organizations that already have or are implementing a BPM CoE.

(4) Exploring organizations to be interviewed: with regard to planning the interviews, the organizations to be surveyed must be identified and selected.

(5) Compile a questionnaire for interviews on BPM CoEs and BPM maturity: a questionnaire was compiled to guide the interviews conducted with the organizations selected. The questions were designed so as to classify the organizations according to the proposed assessment model for BP maturity, considering the method described in "(b)." Questions were organized into three groups as follows: information on the respondent; process maturity; organizational maturity in process management. The questionnaire is shown in the Appendix.

(6) Conduct a pilot interview: an organization was selected for a pilot interview as a pre-test of the instrument.

(7) Conduct the additional interviews: interview the remaining organizations selected.

(8) Classify each of the organizations interviewed according to the proposed assessment model for BPM maturity: the model devised in stage "(d)" was used to identify BPM maturity in the organizations surveyed. This classification should be presented to each interviewee for validation.

3.2 Proposed assessment model for organizational maturity in BPM

Diagnosing an organization's status in terms of process management is important in planning measures to expand BPM methodology. In this respect, assessment models identify the degree of maturity for each of the factors considered vital for this purpose. Thus, given that BPM governance practices are vital in ensuring successful implementation of the methodology, it is suggested they be included in the maturity model. In addition to BPM governance practices, it was also deemed important to include aspects capable of identifying the status of organizational processes. The set of governance practices and other process-related aspects are denominated "attributes."

In compiling the proposed model, based on the research presented in the theoretical framework, the main governance practices identified were integrating BPM into organizational management, performance assessment, allocating responsibilities in terms of process management and disseminating the culture of process management. The selection of practice, first, considered the concepts presented by Müller (2013), Hammer (2013) and Burlton (2013). Hammer (2013) and Burlton (2013) stated that governance actions should include the strategic supervision of process management, establishing guidelines and criteria for prioritizing process improvements and integration between initiatives. Muller (2013) also reports that strategic planning and its different elements guides the identification of improvement needs in business processes, since it is through processes that organizational objectives will be achieved.

The selection of practice, second, is justified by the need for governance models that include establishing goals for processes and monitoring the performance of this process in order to ensure control and recommend improvement opportunities, as reported by Harmon (2004), Spanyi (2013) and Burlton (2013). Richardson (2006) also highlights the importance of governance in promoting enterprise-wide transparency regarding process results. In regard to practice, third, there is consensus among Richardson (2006), Harmon (2004), Rosemann and vom Brocke (2013), Hammer (2013) and Spanyi (2013) that governance should ensure the allocation of responsibilities in terms of processes and decision making. Finally, Spanyi (2013) states that the role of governance is to develop management practices that increase the possibility of successful BPM, making it relevant to include practice, fourth, in the proposed maturity assessment model. This decision is justified by the 2013 report by the National Process Management Survey, where the lack of

organizational culture favoring process management was considered the main barrier to the evolution of Brazilian organizations in implementing BPM methodology (Macieira and Jesus, 2013).

Therefore, it is concluded that these practices should be monitored to ensure that organizations achieve high BPM maturity levels. Furthermore, it is suggested that the maturity of process management be evaluated and information technology adopted in order to determine whether the expected results of BPM implementation are being achieved. Although Smith and Fingar (2003) and Rosemann and vom Brocke (2013) identified two maturity assessment models, namely, process maturity models and BPM maturity models, monitoring the development of process management is a means of assessing whether the organization is in fact evolving.

In regard to maturity levels, the reference model used was the same as that employed by other authors and previously described in the theoretical framework: the CMM developed in the 1990s by the SEI of Carnegie Mellon University, since it is the most widely applied model. Thus, five maturity levels were used to evaluate the BPM governance practices selected as well as the processes and information technology adopted, with 1 as the lowest level of maturity and 5 the highest.

It is important to note that the model presented was validated by the organizations that participated in this study. In order for other organizations to establish their maturity levels for each of the model's attributes, we suggest using the questionnaire developed to interview the organizations surveyed here and the framework presented in Table I, which describes the attributes vs maturity levels.

In describing the maturity of processes using the five maturity levels, organizations whose processes were not identified and varied in each situation (ad hoc processes) were positioned at level 1; those that had begun to identify their macro processes in an initial phase essential for companies seeking to implement process management (Müller, 2013) were classified as level 2; and level 3 organizations were those that had already developed their processes from macro processes, which are mapped and standardized; at level 4 are organizations that map and standardize processes and conduct periodic reviews; and companies positioned at level 5 already managed a substantial portion of their processes, meaning these were mapped, standardized, optimized and periodically reviewed.

With regard to the attribute "tools used," companies classified as level 1 use systems independently from processes. This can be the case for different systems, but all have the same purpose and are used in different areas of the same organization; at level 2 area organizations that seek to optimize the systems used by integrating the needs identified by the areas; level 3 organizations are those that use integrated information systems to execute their processes. They also store information for future consultation or use it to assess process performance; companies that use systems developed to cater to BPM methodology in the automation of their processes are classified as level 4; and level 5 enterprises are those that use BPM systems not only in process automation, but to control and monitor their performance.

In relation to integrating BPM into the organization, level 1 enterprises are those that do not apply any methodology to manage their processes; level 2 companies have some process-related initiatives, but do not approach BPM as the broad methodology that it is; organizations at level 3 already understand BPM as a management methodology; level 4 applies to organizations that adopt BPM as a methodology and integrate it with other methods used; companies positioned at level 5 understand BPM in the context of strategic management, where process management initiatives are defined based on the organization's strategic objectives.

Table I.
Organizational process management maturity model

Attributes	Maturity Levels				
	Level 1	Level 2	Leve 3	Level 4	Level 5
Process maturity	Organization with ad hoc processes where few processes are defined	Macro processes are defined and their interrelationships are shown on the organization's business map	Macro processes are developed into processes, which are then mapped and standardized	Most processes are mapped, standardized and periodically reviewed	Most processes are mapped, standardized, periodically reviewed and optimized
Tool used	Systems are adopted independently by different departments and areas	Systems are used for initial integration between areas	Consolidated systems are used to conduct processes and store information (GED and workflow)	BPM solutions are used to automate and execute processes	BPM solutions are used for process execution, monitoring and control in organizations (management)
BPM integration in organizational management	Process improvement and process management methodologies are not used	BPM as isolated iniciatives	BPM is understood as a methodology and is being internatlized within the organization	BPM is integrated into other management methodologies used by the organization	BPM in a strategic management context
Performance assessment	Indicators and assessment models for process performance are not defined	The expected results of macro processes are identified, but indicators are not in operation	The expected process results are identified and some have performance indicators	Processes have defined performance indicators in a performance assessment model	Process indicators are linked to or developed from strategy and used to assess the performance of employees and the organization
Assigning process-related responsibilities	Process-related responsibilities are not defined. People are restricted to their roles within their own departments and areas	People identify with certain processes and informally take responsibility for a process improvement initiative	The areas that act in the processes (team) are identified and people are appointed to take responsibility for each of them (owners)	Roles are formalized and integrated into the organizational structure. There is also a multidisciplinary team dedicated to supporting BPM initiatives (BPM Center of Excellence)	People take on their roles, have the autonomy to act and the CoE moves from a consulting to a guiding role
Disseminating the process management culture	Individualist culture and focus on performance of the area/department	There is limited understanding of the association between areas and processes	Understanding of how areas fit into processes	Shift in focus from functions to processes for management strcture and performance assessment	Enterprise-wide integrated processes, with people who are engaged and trained in their execution and management

Source: Compiled by the authors

In describing "performance assessment" in terms of the five maturity levels, organizations without process indicators or a performance assessment model were classified as level 1; those that had identified their macro processes and the expected results, but had not created performance indicators to monitor these results were positioned at level 2; level 3 companies had established performance indicators for some of their processes; enterprises that had adopted a performance assessment model with process indicators were placed at level 4; and those with all the characteristics of the previous level whose indicators allowed them to monitor their strategy were classified as level 5.

With respect to "allocating process-related responsibilities," companies at level 1 did not define process-related responsibilities. People are dedicated to carrying out their roles, focussing exclusively on the interests of their own areas and departments; level 2 organizations are those in which people feel responsible for processes, even if only informally; enterprises that identify the teams that act in each of the processes and the "process owners" responsible for monitoring their performance are placed at level 3; level 4 companies are those in which process-related roles are formalized and integrated into organizational structure. Moreover, they also employ people to work exclusively with processes in the form of BPM CoEs; at level 5 are organizations whose "process owners" take on their responsibilities and have the autonomy to act on processes. At this stage it is assumed that the BPM CoE will move from a normative to a coordinative role.

Finally, in regard to "disseminating the process management culture," level 1 describes organizations with an individualistic culture, that is, where people focus exclusively on the interests of their area or departments; organizations classified as level 2 are those that recognize the association between areas and processes; level 3 enterprises are those in which people recognize the insertion of their areas in processes, that is, they acknowledge that processes go beyond areas and departments; at level 4 are companies that have changed the focus of management and evaluate performance of different roles for processes; and organizations whose key figures are engaged and capable of managing processes are placed at level 5.

3.3 Validation of the assessment model for business process maturity

Two organizations were interviewed to validate the proposed model, one of which was the federal university and the other a community college. Since they did not authorize the disclosure of their names, they are referred to in the present study as organizations A and B.

Organization A is a public educational institution founded in 1985 that offers courses in all areas of knowledge and at all educational levels, from basic education to graduate studies. It offers 89 undergraduate courses and 225 graduate studies programs, as well as basic education, technical and technological courses. The faculty consists of 2,612 higher education professors and 121 basic education teachers, as well as 2,799 other employees.

At this institution we interviewed the director of the BPM CoE, who holds a degree in Production Engineering. She has seven years of experience in process management and has served at the institute's BPM CoE since 2012. She reports that the institution began to focus on managing processes this year, resulting in the creation of the CoE.

According to the interviewee, macro processes are not known across the entire organization. Work is currently underway at the CoE to ensure their identification and validation by senior management for subsequent dissemination. Nevertheless, some processes are already mapped and standardized, although most remain unidentified. It is therefore suggested that the organization's process maturity is at level 1, approaching level 2.

As reported during the interview, the BPM CoE has established a close relationship with the information technology department, since no system is currently developed without first being mapped. As such, although BPM solutions are not used, the organization seeks to develop process-based systems. It was also observed that, although initial integration and approximation between areas is evident in terms of their technological needs, integrated systems are not yet being used to conduct processes. It is therefore suggested that the organization is at level 2 in terms of maturity in tool used.

Regarding BPM integration in organizational management, we observed that BPM is understood as a methodology and is being internalized, placing the organization at level 3 for this attribute. According to the interviewee, managers recognize BPM as means of managing the university, although people further down the hierarchy still do not understand its potential, limiting its application to isolated improvement initiatives. In this respect, training courses are underway for all staff in order to broaden the scope of understanding of BPM. The interviewee also stated that interest in these courses has increased significantly in 2014, which may indicate internalization of BPM.

When questioned on the assessment of organizational performance, she informed us that a process-based assessment model has yet to be established. However, she pointed out that this is one of the BPM CoE's objectives for the coming years. We therefore classified the organization as level 1 in terms of performance assessment.

For the attribute "assigning process-based responsibilities," we observed that the organization has not evolved in line with the proposed model, since it already has a dedicated team in place (BPM CoE) to act on processes, it has yet to designate those formally responsible for them (owners). The interviewee reported that although an attempt has been made to appoint process owners, in practice they are not accountable for process performance. As such, we classified the organization at level 2 for this attribute, given that staff identify with some process and have informally taken responsibility for improving them.

Finally, in regard to disseminating the culture of process management, there is an understanding of how different departments fit into the processes and a tendency to shift the focus of functions toward processes, evident in the organization's intention to compile an assessment model to support this. The organization is therefore placed at level 3 for this attribute. When asked what the main barriers are to the dissemination of process management culture, the interviewee emphasized the university's substantial size and the existence of deeply ingrained functional culture. She stated training courses were being conducted to overcome these difficulties, with the goal of disseminating the methodology and raising awareness on process culture.

The framework presented in Table II was used to identify the organization's position in terms of process management maturity and the relevant cells were highlighted, as illustrated in Table II.

Organization B is a non-profit community college founded in 1950, which currently offers 60 undergraduate and 75 graduate courses. It employs 1,100 professors and 1,200 other personnel.

We interviewed the managers of the institute's information technology department and its BPM CoE. The IT manager holds a degree in information systems and specializes in software engineering. He has been employed at the institution for two years. The CoE manager has also worked at the organization for two years and has a degree in information systems with an additional graduate degree in software development. She also has approximately ten years of experience with processes.

Attributes	Maturity Levels				
	Level 1	Level 2	Leve 3	Level 4	Level 5
Process maturity	Organization with ad hoc processes where few processes are defined	Macro processes are defined and their interrelationships are shown on the organization's business map	Macro processes are developed into processes, which are then mapped and standardized	Most processes are mapped, standardized and periodically reviewed	Most processes are mapped, standardized, periodically reviewed and optimized
Tool used	Systems are adopted independently by different departments and areas	Systems are used for initial integration between areas	Consolidated systems are used to conduct processes and store information (GED and workflow)	BPM solutions are used to automate and execute processes	BPM solutions are used for process execution, monitoring and control in organizations (management)
BPM integration in organizational management	Process improvement and process management methodologies are not used	BPM as isolated iniciatives	BPM is understood as a methodology and is being internalized within the organization	BPM is integrated into other management methodologies used by the organization	BPM in a strategic management context
Performance assessment	Indicators and assessment models for process performance are not defined	The expected results of macro processes are identified, but indicators are not in operation	The expected process results are identified and some have performance indicators	Processes have defined performance indicators in a performance assessment model	Process indicators are linked to or developed from strategy and used to assess the performance of employees and the organization
Assigning process-related responsibilities	Process-related responsibilities are not defined. People are restricted to their roles within their own departments and areas	People identify with certain processes and informally take responsibility for a process improvement initiative	The areas that act in the processes (team) are identified and people are appointed to take responsibility for each of them (owners)	Roles are formalized and integrated into the organizational structure. There is also a multidisciplinary team dedicated to supporting BPM initiatives (BPM Center of Excellence)	People take on their roles, have the autonomy to act and the CoE moves from a consulting to a guiding role
Disseminating the process management culture	Individualist culture and focus on performance of the area/department	There is limited understanding of the association between areas and processes	Understanding of how areas fit into processes	Shift in focus from functions to processes for management strcture and performance assessment	Enterprise-wide integrated processes, with people who are engaged and trained in their execution and management

Source: Compiled by the authors

Table II.
Diagnosis of organization A according to the proposed maturity model

The interviewees reported that macro processes and their interrelationships have not been identified. Nevertheless some processes are mapped and standardized, and some of these have been optimized. It is therefore suggested that the organization's process maturity is at level 1.

The fact that the CoE is connected to the IT department in the organizational structure demonstrates that their tasks are performed in conjunction. The IT manager also advised that, in order to promote the CoE, he forwards system development requests to his team for analysis. The interviewees believe that this shows the organization the importance of mapping processes before systematizing them. Thus, the organization strives to develop process-based systems and use BPM solutions. It is therefore suggested that the organization is at level 4 in terms of maturity in tool used.

It was reported that the culture is not widespread within the organization. Other departments acknowledge the CoE as a department that supports system development and helps them solve problems, placing the organization at level 2 in terms of BPM integration in organizational management. However, the two managers advised that initiatives are being planned to accelerate this integration.

When questioned regarding performance assessment in the organization, the interviewees stated that performance indicators are attributed to all mapped processes and are monitored by control panels. We therefore classified the organization as level 3 in terms of performance assessment, approaching level 4. It cannot yet be classified as level 4 because all of its processes are not monitored using indicators.

With respect to assigning process-related responsibilities, the organization seeks to allocate "owners." These individuals are responsible for the performance of processes and must monitor their indicators. The interviewees also related a noteworthy practice carried out to raise awareness among staff regarding the importance of assuming their responsibilities for processes: immediately after implementing improvements, the behavior of the process is jointly monitored by the CoE team and the "owner." This monitoring includes advising the "owner" as to what is expected of him in relation to the processes. As such, the organization is placed at level 4 for this attribute, since the process owner's role is already integrated within the organizational structure.

Finally, we found that process management culture is not fully disseminated across the organization. This is confirmed by the interviewees' statements, who justify it because of the institution's substantial size. However, they believe that the different departments are receptive of the support provided by the CoE. We therefore place the organization at level 3 for this attribute.

The framework presented in Table II was used to identify the organization's position in terms of process management maturity and the relevant cells were highlighted, as illustrated in Table III.

4. Conclusion

We sought to understand which management aspects are needed in order to implement process management. The goal in identifying these elements was to assist in proposing an assessment model for organizational BPM maturity, since these would be the main aspects analyzed. To that end, the theoretical framework was used to pinpoint these elements and BPM governance was identified as a critical factor in ensuring BPM implementation. The BPM governance aspects identified were BPM integration in organizational management; performance assessment; assigning process-based responsibilities; and disseminating the process management culture.

Attributes	Maturity Levels				
	Level 1	Level 2	Leve 3	Level 4	Level 5
Process maturity	Organization with ad hoc processes where few processes are defined	Macro processes are defined and their interrelationships are shown on the organization's business map	Macro processes are developed into processes, which are then mapped and standardized	Most processes are mapped, standardized and periodically reviewed	Most processes are mapped, standardized, periodically reviewed and optimized
Tool used	Systems are adopted independently by different departments and areas	Systems are used for initial integration between areas	Consolidated systems are used to conduct processes and store information (GED and workflow)	BPM solutions are used to automate and execute processes	BPM solutions are used for process execution, monitoring and control in organizations (management)
BPM integration in organizational management	Process improvement and process management methodologies are not used	BPM as isolated iniciatives	BPM is understood as a methodology and is being internatlized within the organization	BPM is integrated into other management methodologies used by the organization	BPM in a strategic management context
Performance assessment	Indicators and assessment models for process performance are not defined	The expected results of macro processes are identified, but indicators are not in operation	The expected process results are identified and some have performance indicators	Processes have defined performance indicators in a performance assessment model	Process indicators are linked to or developed from strategy and used to assess the performance of employees and the organization
Assigning process-related responsibilities	Process-related responsibilities are not defined. People are restricted to their roles within their own departments and areas	People identify with certain processes and informally take responsibility for a process improvement initiative	The areas that act in the processes (team) are identified and people are appointed to take responsibility for each of them (owners)	Roles are formalized and integrated into the organizational structure. There is also a multidisciplinary team dedicated to supporting BPM initiatives (BPM Center of Excellence)	People take on their roles, have the autonomy to act and the CoE moves from a consulting to a guiding role
Disseminating the process management culture	Individualist culture and focus on performance of the area/department	There is limited understanding of the association between areas and processes	Understanding of how areas fit into processes	Shift in focus from functions to processes for management strcture and performance assessment	Enterprise-wide integrated processes, with people who are engaged and trained in their execution and management

Source: Compiled by the authors

Table III.
Diagnosis of organization B according to the proposed maturity model

The integration of BPM methodology is important because limited knowledge of the BPM methodology is identified as a barrier to organizational evolution in process management. As such, the goal is to strategically implement process management by establishing guidelines and criteria to establish priorities for process improvement initiatives. This strategic approach is also related to the second aspect of governance identified (performance assessment), since monitoring process performance tells the organization whether it is achieving its strategic objectives. This strategic plan for developing processes is developed by setting goals and defining indicators.

Assigning process-related responsibilities is also important in ensuring enterprise-wide engagement and continuous improvement initiatives. Individuals should be assigned to manage processes and ensure they perform well. To that end, it is also important to disseminate process management culture, rather than restrict it to the CoE. As such, the goal is for people to understand the integrated nature of their jobs, moving beyond departmental boundaries and recognize the benefits that the BPM methodology can bring to the organization.

The BPM governance elements identified and analysis of the BPM maturity models previously used (described in the theoretical framework) gave rise to the assessment model for organizational maturity in BPM developed for this study. A new and more straightforward model was needed to address the governance aspects identified, since the goal is for it to be used as a tool in diagnosing organizations and planning future initiatives, and not as a mechanism that further distances enterprises from process management. In other words, managers should not feel inhibited by the challenges imposed when using the model.

The proposed model was validated by applying it to the organizations studied and adjusted accordingly, with the final version presented here. Each of the attributes covered by the model was assessed: process maturity, tools used, BPM integration in organizational management, performance assessment, assigning process-related responsibilities and disseminating the process management culture. The model allowed us to diagnose organizations' current situation in terms of process management and provided a preliminary assessment of the next steps in the evolution of maturity for each of the factors analyzed.

Application of the organizational BPM maturity model established that organization A exhibited lower maturity levels for the attributes evaluated when compared to organization B. Based on the diagnosis and the reports generated by the interviews, we identified organizational culture and the range of services provided by organizations as significant factors in the different maturity levels between organizations.

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Appendix. Questionnaire used for organizational interviews(Source: compiled by the authors)

Respondent Information

1. What are your academic qualifications?
2. How much experience do you have applying BPM?
3. How long have you worked at your current company?

Maturity of organizational processes:

4. Does the organization you work at know its macro processes and their interrelationships?
5. If you answered "yes" to the previous question, were the macro processes already known when the CoE was implemented?
6. Are the organization's processes mapped, standardized and/or optimized? How many?
7. When the CoE was implemented, did the organization already have mapped, standardized and/or optimized processes? How many?
8. How frequently are processes reviewed?
9. Is any technology used for process automation/execution? Is it a specific BPM solution? Which one?
10. If you answered "yes" to the previous question, what is the role of the CoE in creating/maintaining this system?
11. Are any tools used to assess process performance? Which ones?
12. Are any tools used to model processes? Which ones?

Organizational maturity in process management:

13. How does the organization understand and apply BPM? (for example: in initiatives, as a management methodology, integrated with other methodologies, in a strategic management context).
14. Does the organization establish any relationship between BPM and other management methodologies?

15. How does the organization assess it performance? What is the relationship between performance and processes?
16. What is your assessment of the dissemination of process management culture in the organization?
17. What are the barriers to the evolution of BOM in the company?

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