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IT INDICATORS AND ORGANIZATIONAL PERFORMANCE: A STUDY OF THE RETAIL SECTOR IN BRAZIL

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Abstract

Technology as a means to meet the needs of an increasingly competitive and demanding market is a reality. This is also true in the retail context. Due to this increases the IT importance that needs to be managed in an increasingly efficient and transparent way to the business areas. As IT becomes more strategic Information Technology management indicators need to be increasingly aligned with business strategy and become once they are an important communication tool in the operating, projects and innovation dimensions. The aim of this study is to identify the importance of IT indicators in a retail company and its relationship with organizational performance. To meet this goal, this study aimed to identify the use of IT performance indicators related to large companies performance in the retail sector. The results showed that: (1) the management of IT indicators in retail is still related to operational management of IT; (2) the performance and value of IT as a whole is still measured based on perception; and (3) the use of IT performance indicators related to business can help IT value of communication in organizations.

Keywords

Indicators, Information Technology, Management

Introduction

The purpose of this study is to investigate the use of information technology indicators in retail sector organizations with operations in Brazil and their relationships with IT performance, alignment improvement between IT and business areas, and additionally their contributions to organizational performance.

The Brazilian retail sector allocates a significant number of resources in the economy. In the period of 2007-2013, it posted nominal growth of 103%, and it achieved in 2013 R\$ 1 trillion, 598 billion in revenues (IBGE, 2014). In 2014, it registered real Brazilian *restricted retail*¹ growth of 5.0%, according to the Monthly Commercial Survey of Instituto Brasileiro de Geografia e Estatística - (IBGE, 2014).

¹ The comprehensiveness of the restricted retail sector excludes vehicles and motorcycles, parts and accessories and construction materials.

The use of technology by retailers has contributed to better use of time for business leaders who can focus on issues such as cost reduction, the best methods of management, and the creation of new products and services to improve organizational performance (Miotto & Parente, 2015). Technology spending in the retail sector has increased in line with the evolution of information technology industry. By 1995, the rate of IT spending and investment in Brazil was 1.1% of net sales organizations. In 2014/15 this figure was 3.1%, with an upward trend (Meirelles, 2015). The widespread use of the many facilities, that have accompanied technological tools, has increased the dependence of business processes on systems applications in these organizations, placing IT services in a critical position to implement the organizational strategies. According to a study conducted by Forrester (2013) in companies in the United States, Canada and the UK, 82% of respondents experienced some form of inactivity in their systems, and 80% experienced impacts on revenues on the order of \$ 137,000 per incident.

To address with this new reality, Information Technology Governance mechanisms aims to provide the correct information technology for management and ensures the efficient use of information systems, allowing for better organizational performance as a whole. The use of technology indicators thereby assists in the control of Information Technology functions, reducing subjective analysis of the relationship between IT activity and organizational performance. In this context, this research aims to examine the following question: How does the use of Information Technology indicators contribute to organizational performance in retail sector companies? To answer this research question this study sought to: (1) identify the role of IT in retail organizations; (2) identify the use of IT indicators at the various organizational levels; and (3) identify the relationships among IT indicators, performance, and organizational performance in the retail context.

Organizational performance and IT performance measurement

Understanding of the organizational performance field has changed much over the past 30 years (Ates, Garengo, Cocca, & Bititci, 2013), having evolved from simple performance measurement processes and reporting of results for performance management, with concern for how to use performance measurements to manage organizations properly (Amaratunga & Baldry, 2002). A study of organizational performance shows performance as a multidimensional construct composed of four elements: (1) focus on performance with the client; (2) the financial and market performance; (3) the performance of human resources; and (4) organizational effectiveness (Mithas, Ramasubbu, & Sambamurthy, 2011). According to (Parmenter, 2007), indicators allow for the capture information about a given reality in a simplified and synthesized manner, retaining the essential aspects to be analyzed. Indicators may be classified as: (1) drivers indicators when monitoring the cause - key performance indicators (KPIs); or (2) indicators of results when monitoring the effects - key results indicators (KRIs). KPIs and KRIs are the elements that are integrated into Performance Measurement Systems (PMS) which allows to control the organizational operations, provides a language for describing performance expectations, and orients how each individual or area can contribute to the realization of the organization's vision (Amaratunga & Baldry, 2002). Although widely used, KPIs and other traditional types of PMS can bring some transparency, comparability and domain independence problems and needs to evolve (Pidun & Felden, 2011). In PMSs literature, there was several management tools introduced for evaluating organizational performance, (Table 1).

Tools	Publication
Malcolm Baldrige National Quality Award	(Seow, Goh, & Xie, 2004)
Performance Measurement Matrix	(Keegan, Eiler, & Jones, 1989)
Integrated Performance Measurement System	(Bititci, Carrie, & McDevitt, 1997)
European Foundation for Quality Management Model	(Management, 2003)
Balanced Scorecard	(Kaplan & Norton, 1998)
Performance Prism	(Neely et al., 2000)
Goal Question Metric + Strategy	(Basili et al., 2007)
Objective and Key Results	(Engelhardt & Möller, 2017)

Table 1. Selected Performance Measurement Systems.

Source: Elaborated by the authors.

The study of performance measurements of the IT function is not new. However, communicating the IT function value remains a challenge for senior Information Technology executives. From the information technology perspective, the indicators are a powerful IT management tool, especially for planning and control functions, and they can also be used to communicate IT value better to organizations (Mitra, Sambamurthy, & Westerman, 2011). Based on interviews with CIOs and senior IT executives from twenty-three organizations, Mitra et al. (2011) proposed a framework for metrics identification through a matrix with indicator groups. The lines in the matrix represent the scope of metrics related to levels of (1) information technology; (2) business processes; and (3) business units. The columns in the matrix represent all the performance areas of the framework. The group areas are (1) operating metrics, (2) project metrics, and (3) innovation metrics.

Studies of the value of information for businesses have indicated that IT creates value when technology is combined with other organizational features, such as organizational structure, work practices and financial conditions (Melville, Kraemer, & Gurbaxani, 2004). From the perspective of IT diagnostics, Meirelles (2015) stated that by means of eight indicators it is possible to obtain an overview of information technology usage in organizations. This diagnosis allows for the identification of the current state of company computerization, comparing it with the main sectors of the economy, allowing for the setting of goals and the mapping of strategic plans of action to improve the use of IT for better organizational performance.

Methodology

This study is characterized by a positivist methodological approach and it has a qualitative focus. The research strategy adopted is a multiple case study combined with a literature review regarding organizational performance and IT performance measurement.

The management indicators are part of control process of IT Performance Management process in IT Governance, that comprises three approaches, namely: compliance, performance and behavior (Luciano, Wiedenhöft, & Moron, 2015). The correct management of Information Technology indicators has a positive effect on their performance, contributing to better use of technological solutions and consequently providing better organizational performance. Figure 2 illustrates the theoretical model formulated from the literature.

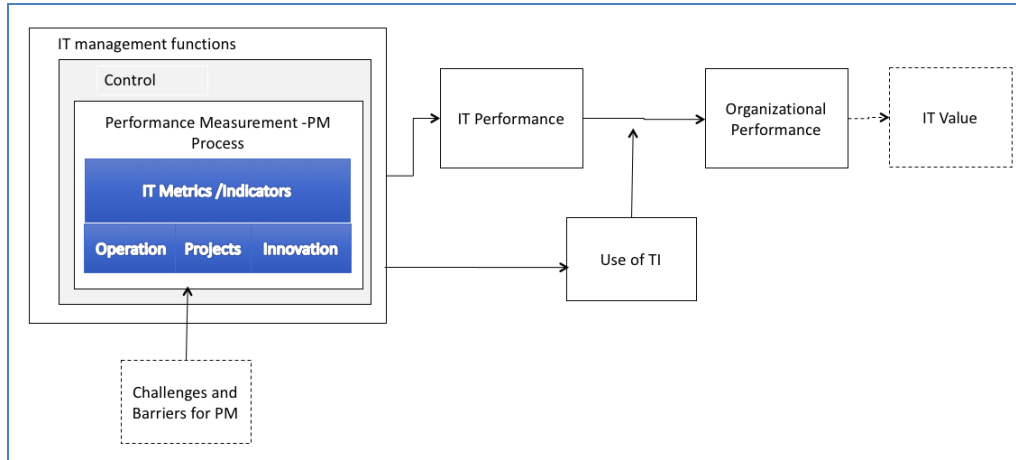


Figure 2: Theoretical model of the study

Source: Elaborated by the authors

As instructed by Yin (2015) the following steps were used in the analysis of cases: (1) development of propositions; (2) case selection and protocol construction; (3) conduct of the study cases; (4) construction of individual reports; (5) performance of the completion of the cases; and (6) construction of combined cases reports. Based on the theoretical framework, three propositions were formulated (Table 3).

Propositions	Description	Authors
Proposition 1	IT indicators in retail are not yet established and communicated by the business needs.	Mitra et al (2011);
Proposition 2	The absence of the management of IT indicators prevents the correlation of IT performance with retail organizational performance.	Mithas et al. (2011)
Proposition 3	The relationship between IT processes, services indicators and retail business processes improves the communication of IT value for business.	(Kauffman & Weill, 1989); (Smith, 2007); Mitra et al (2011)

Table 3: Study Propositions

Source: Elaborated by the authors

The protocol was composed of three parts: (1) procedures for data collection; (2) questions for case studies; and (3) draft report analysis of the study data. The data collection phase was performed from May to November 2015 and used techniques such as documental research, interviews with IT executives, observation and participant observation. The documental research was undertaken from October to November 2015 and included meeting minutes, reports on diagnostic technology area, corporate site, as well as documents, magazines and online newspapers.

Three organizations were selected from different branches: fashion, building materials and automotive services. The criteria for the selection of organizations were: (1) relevance for the sector according to the Brazilian Institute of Executive Retail & Consumer Market - (IBEVAR, 2015); (2) organization size according to the National Development Bank – (BNDES, 2015)

criteria; and (3) availability for conducting interviews with executives and the collection of empirical evidence.

The study unit of analysis was the information technology of the selected organizations. For the interviews, the respondents' selection had the discretion to choose IT managers with seniority and, experience with functions of more than two years, which define, or use technology indicators, in addition to having a holistic view of the organization, business processes and IT processes and services. The semi-structured script was used with twenty-nine questions related to organizational performance, IT performance, IT indicators and performance measurement processes. The questions were grouped into two large blocks, the first focused on information about business insights regarding IT processes and, the second block addressing issues related to the measurement of IT performance.

The use of content analysis aimed to enable the preparation of a detailed overview of the aspects of the studied cases, to verify the validity of the proposals raised and, in addition, to analyze the standards relating to one or more categories of information (Bardin, 2010). Based on the literature, it was possible to list the following categories of information to be explored in the study as shown in Table 4.

Proposition	Information Category	Source of empirical evidence
None	IT Role in organization	Documental Analysis
1	IT Performance Management Process	Documental Analysis
1 and 2	Use of IT indicators by business areas	Interview
1	Use of performance indicators by IT	Interview
1	Challenges in PMS implementation and maintenance	Interview
2	IT performance management and organizational performance Relationship	Interview / participant observation
3	IT performance management and Value	Interview

Table 4. Information Categories
Source: Elaborated by the authors

In order to assure the research work validity theoretical logic was used, blending arguments from cases evidence (quotations), prior research and possible emergent theories. IT was also used three triangulation: (1) among respondents of the same organization; (2) among respondent's data and gathered organization documentation; and (3) among respondent's data and the literature.

Case studies

Retail, by definition, consists of a set of business activities that aims to add value to products and services sold to consumers for personal use (Weitz & Levy, 2000). Retail operation in Brazil began in the nineteenth century. In the twentieth century, with the entry of global retailers, such as Carrefour, Wal-Mart, Casino and C&A, the sector has undergone profound changes (Morgado, 2008). The increased importance of the Brazilian retail sector in the national economy has been mainly associated with the increase of: globalization, the retail power, competition from substitute formats, and the strengthening of partnerships with suppliers aimed at reducing costs,

besides changes in consumer behavior and the consolidation of virtual retail (Parente, Brandão, A, & Plutarco, 2012).

The retail market in Brazil, which is a country that is considered to be emerging, is in transition between traditional retail characterized by small family commercial organizations, independent shops and street markets, and the new modern retail including convenience stores and supermarkets (Barki, Botelho, & Parente, 2013). This period of change has had an impact on the entire retailer supply chain and ultimately on the retailers, who must address the contrasting spending habits among the various social classes (Amine & Lazzaoui, 2011).

According to the annual survey of the management and use of IT companies in Brazil, conducted by the Getúlio Vargas Foundation, the level of spending on technology has shown a positive growth trend, although it is still less than other sectors, such as banking (Meirelles 2015).

Three cases were selected and the organizations are characterized as follow (Table 5).

Characteristics	Case A	Case B	Case C
Branch	Fashion retail	Building material	Automotive services
Employees	17000	More than 5000	More than 4000
Head office	Europe	Europe	Brazil
Stores	294	31	500
Foundation	1841	1923	1949
IT employees	210	170	110
Revenues (2015)	R\$ 5.5 BI (Brazil)	RS 18 BI (World)	R\$ 3 BI (Brazil)

Table 5: Organizations characteristics

Note. Source: Elaborated by the authors

4.1 CASE A – Fashion Retail

The IT area consisted of a contingent of 210 employees and consultants. The area is undergoing a period of role transition in the organization after successful stabilization of its integrated system, and it has implemented agile methodologies for its projects. Nevertheless, the role of IT in the organization remains that of a business strategy implementer.

The department longs for invest in increased agility, transparency and must contribute to the processes and organizational results. The IT performance management process is still being structured. There are approximately 85 indicators distributed into five categories: (1) operation; (2) services; (3) governance; (4) projects; and (5) systems integration monitoring. Suppliers generate a proportion of the indicators by means of the information collected and consolidated in the company's system. The indicators management is decentralized and requires improvements. Currently the IT metrics and indicators are not shared with the business due their very technical level. The exceptions are IT strategic projects and the availability of the system's store indicators, which are generated on demand. The use of IT indicators is an opportunity to enhance the visibility and transparency of IT process management.

[...] There is a great opportunity in the generation and dissemination of IT indicators in the language of business. We can decrease the feeling that IT is a black box, and we are bureaucratic (Senior Manager of Technology).

The use of information generated by performance measurement systems remains static mostly due to a poorly managed process and the lack of a tool that consolidates the information and allows for the recovery of it quickly and easily. The main challenge for the efficient management of IT indicators is the correct reporting of information. In most of cases the motivator is fear of exposure by professionals. Although the recognition of the performance management process importance by the IT department, it still cannot relate the process to organizational performance improvement in a structured manner. The IT contribution to the strategy becomes clearer in the delivery of structural projects because of its visibility. The IT performance in these cases is linked to the perception of business areas. The communication of IT value to the organization based on performance indicators is something to be explored, but it is currently fairly crude. Among the initiatives aimed at improving communication, there is the use of a framework that relates mission, vision and business objectives to indicators, which is known as Objective Key Results - OKRs. The OKRs implementation process is in an early stage and is still restricted to IT.

4.2 CASE B – Building material

Company B is in the midst of implementing its new integrated system. This IT department divides its 170 employees on two work fronts. The first is with professionals who are involved in a project of new integrated systems, and the second is responsible for conducting the on-going operations and smaller impact projects. The CIO is a vice president and reports directly to the Brazilian company's president.

The company is also in the structuring phase of its performance measurement process. Currently, the indicators for management are related to the ITIL processes of incidents and problems as well as indicators of projects and portfolios. The indicators are generated and made available in a decentralized manner by the support, process, PMO team and part by IT partners. The area of process management and indicators, in governance department, was responsible for the project for indicators improvement. The project goals were: (1) the generation supported by IT business indicators; and (2) the generation of strategic indicators for IT. To assist in the project, consulting processes were contracted, which coordinate the steps of mapping and defining the policies for indicators. A total of 130 indicators were defined. The project is in the implementation-planning phase.

Currently, only IT projects and portfolio indicators are available to the business organization. For the new performance management process, the idea is to validate the process initially in IT and then share it with other business areas. The use of indicators generated in the service management, project and portfolio processes are restricted to the technical support forums. The exceptions consist of the indicators that are already being discussed with business in follow-up meetings organized by the demands of management. The main challenge to advance the development of a structured IT performance management is the loss of sponsorship by IT senior management. Due to a restructuring, the IT governance area, with board status, was extinguished, and the initiatives for indicators management processes have lost the speed. Given the fragility of the current processes, the correlation between IT performance management and organizational performance in a structured and objective manner is not possible. In general, the business area attributes good performance to IT project management, especially the project performance of the new integrated system. In addition, the availability of store systems is also an important indicator

for the business. According to the demands manager, the project management indicators assist IT managers in improving the maturity of system development teams.

[...] Three years ago we agreed to implement 10 projects and put ... 2.3 (33%). Since the last four months we are at 100%. This is attributed to the work that each department is doing, the meeting portfolio that is created every month, and every manager who is pulling his team to obtain more maturity [...] (Demands Project and Portfolio Manager).

Given the level of maturity of IT performance management processes, correlation of the good performance of the area with IT value is related to the perception of the performance of delivered projects and the stability of the systems in use.

4.3 CASE C –Automotive services

The IT department of organization in case study C has recently undergone a restructuring of functional areas, which were defined in two new areas: the first called “Transformation” for medium and large projects, and the second called “Support” area consisting of on-going processes including: infrastructure, services and demands (day-to-day projects). The IT area and the entire organization, has highly developed processes for performance management through indicators.

The organization as a whole, including IT, has a well-structured process for performance management. What was only an IT control cell just gaining momentum in the organization and is now a function of the controller, which has a cell management in its corporate PMO. Cell management is responsible for involving all areas of the organization for capturing and monitoring indicators information. All indicators (for project and operations) as well the process were structured, measured, approved involving not only IT department, but also all company directors providing agility and transparency to demand and projects selection process. In addition, the benefits accountability is not only IT responsibility, but also shared with the business area, there is a forum that allows for the all issues to be handled and resolved. All organizational indicators whether IT or business are discussed there.

In the accountability meeting the score is visual, like a traffic light. The business area in addition to know and follow the IT indicators, has shared indicators with the Information Technology department. Some examples are (1) the closing of store transmission indicators for consolidation, which is part of the user store’s operation duty; (2) system training indicators; and (3) project homologation indicators.

The use of performance indicators by IT occurs at strategic levels, through the meeting of "accountability", at tactical levels with managers and coordinators acting, and also at operational levels with the views of a management board. Each level has its set of indicators and the quantity of indicators is smaller for higher levels, but with greater representation. Monthly follow-up meetings generate outstanding activities that are accompanied by management cells. If necessary, a new report on the progress of the problems of action plans identified in projects or operations might be required. Indicators are progressive, that is, are improved year by year, which allows for rising of the level of maturity of IT teams in the search for appropriate and sustainable solutions. Among the main challenges related to the implementation of IT performance measurement systems are, according to the managers interviewed: (1) simplicity of the process; (2) managing

the KPIs that are in conjunction with the business areas and their conflicting priorities; and (3) administering top-down, unscheduled requests. IT performance management is connected to corporate performance management, through a single process using indicators as integrated tools. IT shares indicators with business areas, and the indicators are based on multidisciplinary processes. Proof of this can be seen in the support account manager's report.

[...] This month we contacted the regional stores administrative manager and said: "Look, we have a problem in the N store, this because the N store sent sales for only 15 of the 26 days [...]. Then, you will find that the administrative store assistant was replaced, and the new assistant didn't know the process and did not make the transmission...we solved this internally, and they understand this attitude not as an assault but as aid. This shift in culture was interesting. (Support Manager)

Due to its development stage with the process of IT indicators management, the company has started to work with dynamic indicators that allow for the automated action to be undertaken. This is especially true with the infrastructure indicators to detect, through monitoring, changes in their pre-established values and availability, generating preventive actions without the need for operator interaction. In addition to the dynamic indicators, the indicators that measure the degree of autonomy of the business area in relation to the IT department contribute to communicating the value of IT to the business.

Discussion

The three organizations studied are at different stages of generation, use and communication of IT performance indicators (Table 5)

Information Category	CASE A	CASE B	CASE C
IT Role	Strategy execution	Strategy execution	Technology Architect
IT performance management	Early Stage	Early Stage	Established Process
Use of IT indicators by business	Only for projects	Only for projects	Shared KPIs
Use of performance indicators by IT	Ad hoc	Ad hoc	Levels: strategic, tactical and operational
Challenges in Performance Management Process	Reporting exposure fear	Governance senior management sponsorship loss	Maintain simplicity Shared KPIs with business Unscheduled top-down requests
IT performance management and organizational performance relationship	Perception	Perception	Organizational learning
IT performance management and value	Perception	Perception	Organizational learning Dynamic indicators (availability)

Table 5 – Summary of results
Source: Elaborated by the authors

Table 6 shows the validation of the proposals and their justifications.

Propositions	Results	Justification
Proposition 1	Partially accepted	Case C is an example of organization in which the indicators were created and were reviewed together with business. On the other hand, Organizations A and B still lacks of mature indicators and process.
Proposition 2	Accepted	The organizations A and B have lowest maturity in IT Performance Management with a reflection on their IT roles: strategy execution and their IT value perception by the business
Proposition 3	Accepted	There was consensus among all respondents

Table 6 – Validation of propositions

Source: Elaborated by the authors

The use of IT indicators in these large organizations in retail is being structured, and the relationship of the IT function with organizational performance is still based on perception. The three organizations studied showed great concern with the management of indicators of IT operations categories, wherein the metrics of technology applications availability were considered the most important. It can be inferred that this importance is due to increasingly digital retail resulting in the use of IT as a strategic part of business on an increasingly frequent basis.

Despite the large volume of indicators and information about IT performance, the concentration of metrics related to activities at the operational level leads to an opportunity for the tactical and strategic levels of IT indicators, as well as businesses, to use information. The results showed that only C Company, automotive services, uses indicator information at these levels. The use of this information directly influences the communication of IT value for organizational performance. The existence of IT performance management, which is connected to corporate performance management, through a single and integrated tool, allows for greater alignment in all areas, and for the IT departments to demonstrate their contribution to organizational performance in a structured and objective manner, reinforcing the study by Mitra, Sambamurthy, and Westerman (2011).

The project indicators controlled by the three organizations enable project success in cost, schedule, and scope dimensions. Nevertheless, they do not allow for measuring of success regarding the achievement of project objectives of the business or benefits management and its value and relationship with organizational performance. These indicators are still used to compose the perceived performance of the IT area.

The results also revealed the importance of senior management sponsorship, both in the implementation and in the maintenance of IT performance management processes because indicators information often exposes organizational weaknesses in individual and corporate dimensions. This exposure can lead to resistance due to a lack of maturity and understanding of performance management objectives, which consist of identifying opportunities for improvement and increasing transparency within the organization. This study has shown that the automotive services company, in case study C, already benefits from the management of IT indicators. As related in the study by (Ates et al., 2013) the indicators and their use itself are evolving. However, there has been little literature discussing the use of these indicators in the IT context, relating them to organizational performance. The literature is scarcer when adding the dynamic

retail environment. The dynamism of retail demands monitoring and management of business and IT indicators to provide for rapid and correct decision-making by organizations.

Conclusions

This study aimed to identify the use of IT indicators in retail organizations and how they relate to organizational performance. Among the main findings, it was possible to validate partially the lack of IT indicators communication based on business needs. It was found that the absence of a proper performance management process prevents organizations for correlating IT performance properly with organizational performance. However, in C organization (automotive services), it was possible to correlate the existence of performance management with the value of IT to business. These different levels of maturity in the management of indicators provide different stages of maturity in the IT strategic alignment and business with reflections on the speed in which organizations improve their effectiveness. Company C already benefits from IT indicators to improve its performance in on-site operations satisfactorily. It is also possible to infer that: (1) The IT performance management indicators in the retail industry are still strongly related to operational management, with low connection to business processes. The indicators that appeared most in the study were those related to project management, systems availability, and performance, and information security; (2) The value of technology for business is assigned based on perception, which can generate a subjective analysis by observing only some of the facts; (3) The use of IT performance indicators related to business can be a strategic tool for IT executives to demonstrate the correct value of IT. To accomplish this goal, it is important to have the correct set of indicators, metrics and processes for each organizational level as a manner of contributing to the best decisions and to the sustainability of the process as a whole; (4) The use of dynamic indicators, which have action plans associated with their measures, is a reality that must be explored in depth to grant IT executives the time for analyzing and taking action based on tactical and strategic indicators with greater relevance.

This article contributes to advancing on validating theories about the correct construction, measurement and management of indicators and extends them for the retail context. Similarly, it contributes to retail organizations by identifying the current state of IT performance management in industry reference organizations, and it presenting the main practices, indicator categories and barriers to the adoption of PMSs.

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