

Reasons for adopting an ERP system in a public University in Southern Brazil

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Abstract

It is widely known that enterprise resource planning (ERP) is essential for management of higher education institutions (HEIs). ERP systems are able to cope with the complexity inherent in the nature of business of these institutions. Understanding the reasons that bring a HEI an ERP is as important as the change that this system can cause to the organization. Initially, to provide a better comprehension, we identified from the literature the main reasons commonly associated with adopting an ERP, and, more specifically, the reasons associated with HEIs. Subsequently, we conducted a qualitative approach in public University in the South of Brazil to identify the reasons and difficulties related for ERP adoption. This University opted to develop its integrated internal systems and the results suggest that these reasons are similar to the reasons of other organizations, except those associated with the unique characteristics of those environments, such as the academic processes. It was found, however, that commercial ERP would be virtually incompatible with these organizations.

Keywords

Public University, ERP systems, reasons for adoption

1. Introduction

ERP (Enterprise Resource Planning) is an IS (Information System) of complex implementation (Brodbeck et al., 2010); and requires investments and significant organizational changes (Davenport, 1998), whose implementation demands special care to avoid further losses (Ehie and Madsen, 2005). Therefore, identifying the reason for changing is as important as the change itself (Oliver and Romm, 2002). Furthermore, the motivations for adopting an IS have a persistent and meaningful effect on its use and implementation performance (Poba-Nzaou et al., 2012). Literature evidences a variety of reasons related to the adoption of an ERP. The need for integration, for example, is commonly quoted as an important reason for most organizations (Davenport, 1998) and HEIs (higher education institutions) (Rabaa'I et al., 2009). However, in a few cases these reasons are not explicitly revealed, and motivations are implicit to strategic business purposes (Son and Benbasat, 2007). Another key reason for adopting ERP is related to institutional pressure for competitiveness (Poba-Nzaou et al., 2012; Ugrin, 2009), e.g. the organization is influenced to adopt ERP because its main competitors have already done so (Lai et al., 2012). In other cases, the perception of future users about the utility and complexity of the system are subjacent to the motives (Björn et al., 2012; Bradfors and Florin, 2003; Ruivo et al., 2012).

ERP systems were introduced in HEIs firstly in the USA as an answer for the same issues that encouraged the private sector to adopt them (Fisher, 2006). Currently, the global market of these systems is in expansion, although its implementation in HEIs is revealed problematic due to the limited and specific knowledge involved (Bhat et al., 2013). It is widely known that larger HEIs need an IS to integrate their organizational functions (Lupu et al., 2008), since ERP should support the primary management and academic processes (Zornada and Velkavrh, 2005), providing, in real time, refined, clean and stable information to their users (Lupu et al., 2008). Therefore, the ERP favours the management of services to students, the improvement of staff satisfaction (professors and technicians) and economic efficiency of the HEI operations (Gunman and Chaudhary, 2012; King, 2002).

The aim of this study is to identify the explicit reasons considered by a public University to adopt an ERP system. The proposed method comprises a qualitative approach that enables the evaluation of motivational reasons regardless the fact that ERP is supposed to integrate and support business processes (Schafermeyer, 2008). The article is developed in five sections. The first one introduces and contextualizes the theme, presenting the objective. The second section composes a theoretical review of ERP systems, followed by the main reasons for being adopted by organizations and, more specifically, the motives and problems related to HEIs. The third presents the proposed

method, whose results are described on section four. The fifth section is the conclusion and proposal for future research.

2. ERP system

An ERP system is an informational system capable of structuring transactions that crosses functional borders (departments). This system is made by an integrated group of computational modules that support organizational processes (O'Brien and Marakas, 2013). These transactions are structured in processes flow, which are already defined during system design, meaning that they are incorporated to the system architecture (Davenport, 1998). The APICS dictionary (2010) defines ERP as a system capable of organizing, defining and standardizing the necessary processes to manage an organization with effectiveness. ERP system corresponds to a generic solution, which reflects a number of considerations on how companies usually operate; it incorporates itself and imposes its logic on the strategy, culture and processes, driving the organization to suit strategic business processes. Usually, business processes incorporate the common practices and "best practices" (Davenport, 1998; Klaus et al., 2000).

O'Brien and Marakas (2013) argue that ERP provides the company an integrated and real-time view of its key processes, such as production, order processing and inventory management, linked to a common database, shared and managed by the system. Further, ERP is capable of tracking the organization's resources (financial, raw materials and production capacity) and the status of the commitments undertaken by the organization, such as purchase order, delivery order to the customer. The scope of ERP systems, according to Arnold et al. (2011), is to allow tracking orders and other important information from planning and control throughout the organization, from the acquisition process until the last instance of products delivery and customer service. In addition, many ERP systems are capable of allowing managers to share information between companies, meaning visibility throughout the supply chain extension.

The adoption of an ERP system demands from the organization the formulation of clear and objective definitions, as well as expectations of the results that the system can provide (Umble and Umble, 2002). Similarly to expectations, the reason for adopting such technology is compatible with values, beliefs and previous experiences of future users (Light and Papazafeiropoulou, 2004). Pragmatically, the extent of change is directly related to the use of ERP system; the bigger the transformation planned for the organization, the greater the level of its adoption (Buonnano et al., 2005). In this context, organizational changes associated with the adoption of an ERP are related to the desire of improving the quality of products, services and reliability of the processes (Holsapple and Sena, 2005). The standardization of organizational processes is an alternative to meet such desires (Hassabelnaby et al., 2012). Additionally, the lack of standardization among organization's departments becomes an important trigger for organizations to drive their transformations through an ERP implementation (Rich and Dibbern, 2013). This implementation provides an opportunity to reduce variability and smooth operations and information flows, improving customer response time (Ross and Vitale, 2000).

The integration between information systems and organizational functions, in fact, are usual reasons evidenced in literature for the adoption of an ERP (Holsapple and Sena, 2005; Poba-Nzaou et al, 2012). Furthermore, ERP provides support to decision-making, both managerial and strategic, and creates a common interface between processes and organizational functions in order to facilitate the global performance of organization (O'Brien and Marakas, 2013; Ross and Vitale, 2000). Based on the taxonomy classification for ERP's reasons for adoption, developed by Parr and Shanks (2000), Table 1 consolidates the main reasons identified in literature, according to three dimensions: (i) technology, (ii) management and operational and (iii) strategic. The reasons found on the technological dimension are related to infrastructure and cost of IT (information technology) maintenance, such as the integration of systems that operate in the company. The managerial and operational reasons are linked to processes and costs reduction. Finally, the strategic motivations are associated with the strategic direction of the organization in the long term (Parr and Shanks, 2000; Poba-Nzaou et al, 2012).

Table 1. Main reasons for adopting ERP system according to literature

Dimension	Reasons	Authors
Technological	System integration	Lupu et al., 2008
	IT costs reduction	Souza and Zwicker, 2000.
	Access to real time information	Dembla, 1999; Oliver and Romm, 2002
	Obsolesce	Kamhawi, 2008, Kumar et al., 2002; Rikhardsson and Kraemmergaard, 2006; Souza and Zwicker, 2000; Yusuf et al., 2006.
Management /Operational	Process performance and productivity, response time	Bhat et al., 2013; Holsapple and Sena, 2005; Kamhawi, 2008; Oliver and Romm, 2002; Ross and Vitale, 2000.
	Functional integration	Buonanno et al, 2005; Kamhawi, 2008; Kumar et al, 2002; Oliver and Romm, 2002; Rabaa'I et al., 2009; Ross and Vitale, 2000.
	Process standardization	Buonanno et al., 2005; Davenport, 1998; Holsapple and Sena, 2003; Kamhawi, 2008; Oliver and Romm, 2002; Rich and Dibbern, 2013; Ross and Vitale, 2000; Souza and Zwicker, 2000.
	Reduced operating costs	Buonanno et al., 2005; Dembla, 1999; Kamhawi, 2008; Ross and Vitale, 2000; Souza and Zwicker, 2000.
	Process automation	Rich and Dibbern, 2013
Strategic	Modernization and dissatisfaction with older systems	Oliver and Romm, 2002; Souza and Zwicker, 2000.
	Strategic decision-making, management reporting	Buonanno et al, 2005; Kamhawi, 2008; Kumar et al, 2002; Souza and Zwicker, 2000.
	Institutional pressures	Kumar et al, 2002.
	Business flexibility	Holsapple and Sena, 2005; Kamhawi, 2008; Rikhardsson and Kraemmergaard, 2006.
	Organizational changes	Holsapple and Sena, 2005.
	Image	Oliver and Romm, 2002.
	Competitive advantage, and introduction of new services-products and new opportunities	BottaBotta-Genoulaz et al., 2005; Bradford and Florin, 2003; Hassabelnaby et al., 2012; Rikhardsson and Kraemmergaard, 2006; Ruivo et al., 2012.

3. ERP in HEIs

Investments in ERP are high and the benefits' expectation has strategic values for the company. Therefore, it is important to understand the relation between benefits and reasons before adopting these systems (Gunasekaran et al., 2006). Kamhawi (2008) empirically found that there is a significant relationship among reasons, planned objectives, and the perceived benefits with the adoption and continued utilization of an ERP. The author suggests that by emphasizing different reasons, the associated benefits are prioritized in order to increase the chance of a successful system implementation. Further, the factors influencing the adoption of a technology such as ERP can be different from the factors that justify its continued use (Son and Benbasat, 2007).

A HEI can justify its acquisition or internal development, although the reasons for its continued use may differ from the expectations built by the institution. King (2002) suggests that the ERP is able to align the fragmented or disparate units of a HEI thanks to its built-in processes based on best practices (Davenport, 1998; O'Brien and Marakas, 2013), its common interface and analytical availability (Lupu et al., 2008), the possibility for establishment of communication transparency and track of information (Gunaman and Chaudhary, 2012). Moreover, ERP improves transaction processing and administrative efficiency by reducing institutional costs and improving student services (Zornada and Velkavrh, 2005). Lupu et al. (2008) mention that HEIs seek opportunities to provide students access to information and update their academic information in the internet. The ERP, in addition to provide this interface between students and the institution, enables the consolidation of this information into a single database, reducing duplication of data entry and bringing flexibility and better response to user (King, 2002; Lupu et al., 2008).

Oliver and Romm (2002) state that the desire for integration is the major reason for adopting ERP by larges HEIs. The authors argue that these institutions show themselves receptive to the idea of integrating different administrative

functions into single software, obtaining continuous information flow, and eliminating the restrictions on communication. Similarly, Rabaa'i et al. (2009) point that integration as an important reason elected by HEI. After the need of integration, continuous improvement on processes' efficiency is a common justification of HEIs (Bhat et al., 2013; Oliver and Romm, 2002). This expectation is usually based on reduction of operational costs (Ross and Vitale, 2000), and aims to improve the performance of learning services for students (Abugabah and Sanzogni, 2010). Moreover, not friendly interfaces and inadequate features turn usual systems unsuitable for current demand of a HEI (King, 2002). The upgrade of the IT environment of HEIs is, therefore, another important reason for the ERP adoption.

The organizational complexity is an institutional response to deal with fuzzy activities coordination usually found in HEIs (Schuandt, 2009). Buonanno et al. (2005) suggest that an ERP is capable of dealing with a significant level of complexity. Bhat et al. (2013) quote that an ERP provides management support to deal with the administrative complexity in HEIs through processes' automation. Further issues related to the increase of complexity end up generating internal demands for transparency, reduction of controls and simplification of processes (King, 2002). In the context of HEI administration, organizational studies with regards to the complexity of these environments are still scarce (Papaioannaou and Koutselini, 2007). Clark (1986) suggests that the complexity of HEIs systems is a consequence of the necessary changes for the interests of specific users. Both students diversity as knowledge and work specialization are forces acting towards the increase of activities complexity. However, the implementation of an ERP in a HEI can be problematic (Bhat et al., 2013). Sullivan et al. (2013) as well as Pollock and Corford (2004) consider HEIs as unique organizations, and highlight their complex nature due to organizational structure and diffuse authority. HEIs are companies that produce multiple services; the inputs and outputs of production processes are heterogeneous and involve variables that are usually unrelated to market variables (Sullivan et al. 2013).

4. Research method

The research method is of applied nature and explanatory purpose, since it proposes to identify reasons and problems associated with adopting an ERP in the context of a public University, whose evidences in literature are still scarce (Bhat et al., 2013; Pollock and Corford, 2004; Sullivan et al., 2013). The proposed method encompasses a qualitative approach (Appolinário, 2004; Gil, 2007) in order to identify such reasons and better comprehend the difficulties involved with ERP adoption in a public University of Southern Brazil. Structured interviews (Silveira and Cordoba, 2009) previously prepared were used to capture these reasons with employees of the Federal University of Rio Grande do Sul (UFRGS). The selection of such procedure can be justified by providing flexibility to the interviewer and deepening of some topics and new questions' formulation throughout the interview process (Manzini, 2004).

The script of the interviews was originally prepared based on the most frequent reasons mentioned in literature, which were aforementioned in Table 1 and adapted to the characteristics of an academic environment. Respondents were selected according to the importance of their roles in the institution. Twenty two members were selected: the director of data center (CPD); the University's coordinator of the technology development plan; the director of processes office (DIPI); the responsible for undergraduates developing; the infrastructure manager of engineering school; two IT analysts, who are responsible for systems development; 10 professors from engineering and business schools; and 5 employees from central administrative staff. The interviews were administered, recorded and transcribed on May of 2014. Identification of reasons and common points were consolidated in order to obtain a list of reasons that have been categorized according to the taxonomy shown in Table 1.

5. Results

The University which was the object of this study is centrally located in Porto Alegre, one of the main cities of the South of Brazil. It is a public institution with over 100 years of experience with national and international recognition. In 2014, it had approximately 40,000 enrolled students (29,000 undergraduate), 2,500 professors and 2,800 administrative staff. The organizational structure is divided in 27 academic units (13 institutes, 10 colleges and 4 schools), including central warehouse, veterinary clinics hospital, data center, clinical hospital and 32 libraries. The idea of integrated academic systems was subject of debates in late 1980s at the university. Currently, the systems development model is migrating from the perspective of identifying internal customer requirements (and subsequent development of system functions) to a development model focused at management processes. Historically, the public University has been internally developing its own integrated systems, whose approach is a usual trend in many HEIs (Lupu et al., 2008). The integrated IS references are equivalent to modules from a traditional ERP system. This integration occurs through the institutional database of the university. Therefore, the public University would need to adjust the ERP processes to the reality of its internal processes, especially those

linked to the management of academic processes. Another contextual aspect is that, due to its current management policies, each department is allowed to establish their specific rules and processes. Such fact significantly increases the diversity and customization of existent processes, which entails a higher complexity and difficulty for ERP adoption.

Results are organized into four categories, as shown in Table 2. The first category is according to integration motives. This cause can be considered the driving force to the continued development of integrated IS. Besides, interviewees quoted integration as a major reason if compared to other reasons. The integration enables a consistent flow of information within the University. The information remains available in one place in order to ensure the integrity and quality of information. From management perspective, integration allows users, technicians and professors a better understanding of the process from start to finish (horizontal view), which is not a common fact in many Universities (Abugabah and Sanzogni, 2010). This finding is based on comments collected during interviews, such as:

“University departments know what they do, but do not understand the logic of the business process in a broader perspective; which results in a fragmented and punctual activity. They do not know the impact of their actions on other departments and society.” (Infrastructure Manager of Engineering School)

A challenge linked to integration perspective is the development of a culture driven by goals and objectives, yet poorly institutionalized especially at public Universities. Many interviewees identified the expectations that ERP might promote cognitive changes in the way of work, which is usually time-consuming. There are several interfaces and systems operating continuously with different functions, such as: warehouse, human resources, aid control and students housing. Therefore, there are difficulties in communication and information transfer among administrative departments. The integration is an alternative to reduce inputs of data and inconsistent information. Currently, there is an effort to integrate the housing systems and student aid system.

The standardization category is highly related to the way processes are currently performed. Administrative processes are easier to incorporate into ERP than the academic processes; yet, there is a growing effort to incorporate these. The benefit expectation is to improve process performance in terms of agility, mainly due to reduction of existence and long bureaucracy processes, which are common in public Universities. Further, there is and institutional pressure for operating costs reduction and efficiency improvement. Besides speed, standardization together with integration promotes better interaction between professors and students, addressing students' demands through a more effective approach. The automation of repetitive processes, such as administrative routines, presents effects in response time, physical files and technical administrative effort (reduction of redundancies at work). These reasons are also related to motivational issues and welfare at work.

The need to support managerial decision making process is another important category. The IS must be capable to provide reports for multiple processes, saving working hours and reducing time to find useful data. There are different systems with one responsible for each. Thus, accessing information is slow and fragmented, resulting in decision making difficulties. Student assistance, for instance, needs to cross-check information from the student's academic life (course, academic performance, housing situation, among others) and student assistance. In addition to managerial decision making, the system should provide consolidated data, making it an important tool of analysis and strategic decision making. These multiple interfaces provide complexity to current IS, and promote personnel training issues.

Table 2. Reasons to develop integrated IS on HEI

Perspective	Reason	Definition
Integration	Flow of consistent information	Quality information, redundancy reduction; source of information and access available in a single (or reduced potential sites) site and in real time.
	Horizontal viewing	Process view: beginning to end, perception of the impact of other departments activities and in the academic community in general.
	IS integration	Modernizing systems; multiple interfaces reduction
	Communication between departments	(Mainly) Among academic departments aiming at better teaching contribution.
Processes	Standardization and knowledge management	Homogeneous activities; cognitive work change; knowledge availability (as opposed to retention).
	Automation and agility	Task runtime reduction, repetitive routines especially in cases involving bureaucracy, increased productivity; reduction of physical files (paper).
	Reduced operating costs and increased efficiency	Leaner and more efficient processes, reducing the number of operating staff.
	Server motivation	Increased time spent in activities that add value to the academic community.
Decision-making	Analytical skills	Refers to multiple sources of information and consolidation of reports.
Complexity	Diversity	Multiplicity of interest variables: departments, students, courses.
	Organizational departmentalization	Structure type that hinders communication and increases complexity.
	Academic freedom	University policy of freedom on the academic management by teachers.
	Changes	Emergence of new courses, selection processes, educational and administrative departments.

The complexity of academic environment is a reason to continue pursuing an integrated IS. All interviewees recognize that the complexity shown through internal diversity is a reason for integration, standardization and formalization of processes with IS support. The increase of fragmentation, size of University (students, courses, teachers and technicians) and complexity of processes are suggestive for ERP adoption. Moreover, interviewees point difficulties in integrating the institutional database with federal government's IS. Employees' payroll process, for example, occurs through both University's and federal government's IS. Similarly, the process of procurement also finds barriers related to communication with government's IS. However, the waste of resources involved in this situation is a paradox: there is a consensus among interviewees about the lack of developers (programmers) of IS, which means that the University cannot meet the demand in terms of IS to support the administrative and academic functions.

5. Conclusions

The presented study aimed at identifying the reasons for adopting ERP systems in a public University located in Southern Brazil. Results show that this public University presents similar reasons than other organizations to adopt ERP systems. These reasons were investigated through semi-structured interviews with key members of the University, and whose roles are highly related to the development IS. A major finding is the trend that the University presents to, unlike other private organizations, internally develop their systems due to discredit that a commercial ERP could meet the academic interests.

The mains reasons were categorized in integration, process, decision making and complexity. Results confirm that integration is a fundamental need, especially in a public University where diversity and complexity are usual higher than other HEIs. The quality of information flow and the horizontal viewing concern emerging issues to University, mainly because of its fragmented organizational structure. Further, the approach for identifying reasons for ERP adoption within a public University environment features another contribution. Such context is explored to a limited

extent, with even lower attention to public institutions, which suggests a deepening of knowledge on the complexity issue. As a practical contribution, the study provides a relevant perspective to discuss the standardization of the academic environment. Currently, this question seems delicate, involving the concept of academic freedom and its barriers. In addition, from the technological point of view, the research provides basis to justify the development of new collaborative tools for academic management and new application programming interfaces for both internal use and to integrate with government's systems.

The article provides some evidences of the relationship between knowledge management and IS. However, it only enabled an initial understanding. As future research, it is proposed to deepen that relationship in order to develop collaborative tools, as in Frank and Ribeiro (2012), who explore the IS ability to allow the transferring of knowledge and communication on new projects development.

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Biography

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