Beyond Knowledge Integration Barriers in ERP Implementations: An Institutional Approach

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Abstract

The objective of the article is to go beyond the knowledge integration barriers in ERP implementations by analyzing structural, technological, intellectual and socio-emotional barriers that appear during an ERP implementation project. Using an action research methodology, the article provides some hints highlighting the knowledge integration process, and proposing an Institutional Model of ERP Knowledge Integration where ERP "best-practices" affect and are affected by institutional logics through legitimacy and isomorphism mechanisms, showing two processes of institutionalization: (1) processes that challenge knowledge integration barriers by embedding ERP "best-practices" in the expected formal functioning of the organization as well as in the routines and habits of employees; and (2) processes that operate as drivers of evolution and change by embedding the institutional logics and new requirements within ERP "best-practices".

Keywords: ERP, institutional logics, action research, institutional theory, knowledge integration

1.   Introduction

The combination of Enterprise Resource Planning (ERP) systems 'as the primary platform for organizational information and of Internet technology for providing access to it will be the hallmark of leading organizations in the new century' [1, p. 3]. Despite its potential benefits for firms, the implementation of ERP can be complicated and costly, and in most of the cases results in project failures [2]. Furthermore, ERP implementation has been a source of great challenge not only for large organizations [3]-[5]; but also for small and medium-sized enterprises [6]-[8] with a high rate of failures [9]. It can be explained because an ERP implementation is a complex process where organizations must align technology with organizational, social, cultural, economic, technical, and other institutional forces [10].

While ERPs can be configured in different ways, software vendors suggest configurations that reflect the "best-practices" in each business sector; hence, organizations face pressures to conform these "best-practices" [11]. Robey et al. [9] suggest that the main obstacle in an ERP implementation is the firm's knowledge of existing systems and business processes because previous work habits and

organizational routines faced by users working with legacy systems may be confronted by ERP's logic [12]. In this sense, pre-existing structures may pre-dispose organizations to challenge the logics of new enterprise technologies as well as new technologies may be selectively appropriated to be consistent with existing institutional conditions [11]. ERPs take into account numerous assumptions about how organizational processes should work; hence, despite that implementations pay special attention to the configuration of the system, the fit to organizational needs is often inadequate [13].

There is a lack of research studies related to the ERP implementation process from the viewpoint of knowledge integration trying to reduce the conflicts between the new knowledge embedded in the ERP and institutional logics within organizations that adopt the new system [14]. With this goal in mind, the study attempts to facilitate knowledge creation, retention, and sharing, paying special attention to the collaboration among different organizational actors. Nwankpa [15] argued that establishing more effective mechanism for knowledge integration across the whole organization makes knowledge acquisition activities become easier to do, reducing knowledge disparity among organizational units. On the other hand, organizations without effective mechanism for knowledge integration fail of absorbing external knowledge, losing the expected benefits of it [16]. In this sense, employees could have difficulty to assimilate the concepts of integration and process orientation of ERPs [9]; hence, successful ERP implementation can also be seen as developing new cross-functional knowledge, capabilities and competence for the organization [17].

Specifically, this research study focuses on the interactions between the institutional logics and the best-practices supported by an ERP system, using an Action Research (AR) approach and through the lens of institutional theory. The objective of the article is to go beyond the knowledge integration barriers in ERP implementations by analyzing the main identified barriers in a case study, providing some hints to highlight the knowledge integration process, and proposing an Institutional Model of ERP Knowledge Integration where ERP "best-practices" affect and are affected by institutional logics through legitimacy and isomorphism mechanisms. This paper is structured as follows. First, it analyzes previous studies to identify the most relevant and related literature. Next, it reports the research methodology. Then, it presents the case study, highlighting key actors as well as the context in which the case is immersed. Finally, it promotes the discussion of the results to engage readers and summarizes the main findings in the conclusion section, proposing some challenging paths for further work.

2.   Theoretical Background

2.1.   Institutional Theory

Institutional theory has proven to be a central analytical perspective for investigating the role of social and historical structures of information systems (IS) implementation. However, it does not explicitly account for how organizational actors make sense of

and enact technologies in their local context [18]. Their study contributes to IS research by showing the need to address macro-level structures, as well as individual interpretations and practical use situations, in order to identify how and why information systems are adopted by users. In the institutional perspective actors 'accept and follow social norms unquestioningly, without any real reflection' [19, p. 176] and seek legitimacy more than efficiency [20]. In this sense, Son and Benbasat [21] suggested that when organizations adopt IT systems, they take into account not only social norms, but also institutional expectations; which are influenced by the external environment. Furthermore, DiMaggio and Powell [22] proposed that in the quest for legitimacy, organizations interact with other organizations, restructuring them and becoming more similar (i.e., isomorphism). At the same time, 'organizations are suspended in a web of values, norms, beliefs, and taken-for granted assumptions' [23, p. 93] that guide and constrain their actions over time [20].

Robey and Boudreau [24] proposed the use of institutional theory to understand the processes promoting and impeding change in organizations. Gosain [11] conceives ERPs as having institutional elements and also being subject to institutionalizing pressures. Poba-Nzaou et al. [25] found that the institutional context explains the pressures that an organization suffers not only aligning its practices with the best practices embedded in the ERP as well as with the regulatory requirements, but also adapting itself to the power fights among different stakeholder groups. This perspective provides a better understanding why ERP implementations fail by looking at the existing institutionalizing elements at work in the organization and in its historic social and technical choices. In this sense, there are two competing forces within ERPs because they can be used not only to facilitate stable operating environments acting as inhibitors of future change, but also can promote the embedding of practices that organizations seek to institutionalize [11].

New system implementation can be a chaotic experience when workers cannot make sense of the new cognitive and normative rules embedded in the new system [11]. In the context of ERPs, different users work with the same technology interdependently, becoming difficult for individuals performing specific roles to use this technology differently from the way others expect them to use it [11]. Dunn and Jones [26] stated that further studies should consider organizations as institutionally plural systems, because they are subject to multiple, and often contradictory, institutional logics simultaneously [27]. However, organizations have to manage the potential conflicts between their institutional logics and the "best-practices" embedded in ERPs [11], and the only way to obtain a successful implementation is through loose coupling between organizational practices and standardized ERP practices, increasing the likelihood to reach knowledge integration.

2.2. Knowledge Integration

According to Grant [28], knowledge-based firms use rules, routines and other integration mechanisms to facilitate knowledge integration, minimizing communication and knowledge transfer. As a result, formal procedures can be designed to enable employees to deal more effectively with its inevitable

contingencies and taking advantage of the organization delayering to accelerate decision-making [29]. Furthermore, Bohorquez and Esteves [30] extend the knowledge-based view, recommending that organizations not only have to consider existing knowledge but also have to be open to new ways of organizing and structuring participants; hence, coordination and socialization mechanisms are important to reach potential and realized absorptive capacity, which is the previous step to knowledge integration.

Knowledge integration is defined as an on-going collective process of constructing, articulating, and redefining shared beliefs through the social interaction of organizational members [31]. They argue that the critical challenge of integrating knowledge at an ERP implementation lies in the ability to bring the key parties together. Therefore, it is important to take into account multiple sources of knowledge [32] because the integration process is often met with obstacles, as knowledge is frequently tacit and embedded within the system and within the organization, making knowledge slow and painful [33]. The main contribution of Pan et al. [31] is to offer a knowledge integration perspective that considers an ERP implementation as a process of collective social construction which can be influenced by internal participants as well as external participants.

On the other hand, Huang et al. [34] suggest that the nature of knowledge integration can be conceptualized based on four distinctive but interrelated dimensions: structural, technological, intellectual and socio-emotional. The first dimension is related with the firm complexity, the second one with the technological tools used in the organization, the third one with the employee capacity to learn and the last one addresses the point that socialization is an essential process to overcome departmental boundaries. In this regard, the dynamics of knowledge integration in the context of ERP implementation are not limited to within the departmental/organizational boundary; instead, knowledge integration is an ongoing process which takes place inside and outside organizations, exchanging internal and external knowledge. Therefore, organizations should establish formal and informal channels in order to spread the required knowledge and skills to take full advantage and use of an ERP system [35].

While previous studies have examined the impact of knowledge integration and its implications, there is a lack of studies that have explored the process of knowledge integration using institutional theory as the main theoretical framework [14], [31]. Lin et al. [36] proposed that for a better understanding of ERP implementation failures researchers should adopt a knowledge perspective; hence, the main goal of the study is to cover this gap and extend the literature related with the process of knowledge integration in an ERP implementation context.

3.   Research Methodology

A way of putting institutional theory into practice is incorporating central ideas from action research, including the importance of tacit, local knowledge, combining actions, insights, and the role of research as a change engine in organizations [37]. These authors propose that a combination of institutional theory and action research

may emphasize the need to understand the interaction of social structure and agency in creating conditions for stability and change. In this vision, it is important to understand the motivations of institutional work and why actors choose particular strategies, considering not only the institutions on which the work focuses but also the system of institutions within which that work occurs [37].

The methodology used in this study was an Action Research (AR) approach through the lens of institutional theory conducted in an organizational context. Baskerville and Myers [38] stated that AR methods provide a potential avenue to improve the practical relevance of Information Systems (IS) research. This approach has been accepted as a valid research method in other applied fields such as organization development and education [39]. In addition, many authors have argued that the particular characteristics of AR make it predominantly applicable in an applied discipline such as IS [40], [41]. Therefore, AR provides an excellent framework for an exploratory study of the ERP implementation process. In this regard, it enables to investigate the complexity and issues within the organizational context of the enterprise [42].

Authors have chosen this methodology because one of them was inside the situation, and he was part of the consulting team that participated in the ERP implementation project. Therefore, he was inevitably influenced by what was happening [43], and he was both participant and agent of change [44]. In a way, the researcher's role was one of facilitating throughout the process of the research and creating insights through 'expert' opinion in the research process [45]. Moreover, this topic is suitable to this methodology because identifying the knowledge integration processes, in an ERP implementation context, a researcher needs to know the ERP System, the organization in which the ERP was implemented, and the implementation process which may involve a complex juggling act of costs and benefits in which individuals have to deal with and manage complex social and psychological tensions [37]. At the same time, individuals not only act as catalysts for change but also are transformed in the process [46].

The fact that one of the authors was part of the consultant team contributed to a total immersion within the context of the study, obtaining excellent access to the knowledge base and documents within the organization and within the ERP implementation process. Field notes of daily observations were taken as well as recording of events, providing a deep understanding of the social and organizational context of the study. This situation allowed the researcher to "build a complete picture of the ERP implementation process" because he acted not only as a researcher but also as a part of the implementation team, having a dynamic and interactive participation to enhance the understanding of the whole knowledge integration process by promoting discussions that disrupt different ways of participants' thinking. This double-loop process denotes reframing of actor's viewpoint, enabling dramatic changes in understanding and action particularly during major organizational change [47].

The unit of analysis was the implementation team represented by key users and consultants; hence, the knowledge integration activities, related to the ERP implementation, had considered a broader organizational context as well as the

contribution of the consulting firm. The researcher belonged to the ERP implementation project for almost two years and then served as an independent consultant for a period of three months, investigating the problems of knowledge integration and proposing solutions to solve them. Data collection was done through multiple interviews, attending workshops, brainstorming sessions, informal conversations, socialization, discussions and meetings; not only inside the company but also with the other members of the consultant team.

4. Case study

4.1. The company

Today, ABC (fictitious name) has over 250 employees, occupies over 30,000 sq. meters (323,000 sq. feet), has annual sales close to US$50 million – which place this company within the 200 largest companies in Peru – and holds a leading position in the three fields where its business activities develop: flavors and food ingredients, animal health and nutrition products, and natural ingredients with an active and increasing participation in international markets.

4.2. The consulting company

BigOne (fictitious name) is one of the best-known consulting companies in Peru. This company not only has projects in this country but also it is present in other Latin-American countries. Many of its clients are leading Peruvian organizations or multinational companies that want to standardize their operations around an ERP system.

Nowadays, BigOne has more than 100 full-time consultants with a deep knowledge in organizational issues and information systems. Most of them have experience in implementation of ERPs in many industries. The years of experience and the deep knowledge of the Peruvian and Latin-American environment are the competitive advantages of BigOne.

4.3. The context

Previous to the ERP implementation, ABC had islands of information with different programs that fulfilled different tasks. In this regard, the system department was responsible for program development to satisfy the requirements of the company. This department has been stronger across the years because it controlled all the information inside the organization. However, the poor integration of the existent programs, the duplication of data and effort, and the frequent update of legal requirements convinced the board to acquire an ERP system.

Since the beginning, the system department was against the adoption of a new system. This department was convinced that no ERP could give the company the functionality that each area had independently. This was the truth because an ERP system is a standard package of best-practices that cover the main functions of a

company. However, on the other hand, the programs developed by the systems department were like a "tailored wedding dress"; hence, despite all the problems mentioned above, each program fulfilled particular requirements for each individual user/area. Therefore, the collaboration of users was very poor because they do not understand that the ERP system was better because it brings data integration and consistency of processes. Additionally, they found the ERP very bureaucratic, because after the ERP implementation they will have more constraints in terms of data validation and workflow. In this context, the board offered one of the authors the possibility to analyze the presented problems, suggesting some paths to solve them.

5. Discussion

Today, ABC (fictitious name) has over 250 employees, occupies over 30,000 sq. meters (323,000 sq. feet), has annual sales close to US$50 million – which place this company within the 200 largest companies in Peru – and holds a leading position in the three fields where its business activities develop: flavors and food ingredients, animal health and nutrition products, and natural ingredients with an active and increasing participation in international markets.

Based on an extensive analysis, the author identified three blocks as the main Knowledge Integration Barriers: Structural Barriers, Technological Barriers, and Intellectual and Socio-Emotional Barriers. The understanding of these three dimensions is critical to align ERP best-practices with the institutional logics, having a smooth knowledge integration process, and within the schedule of the ERP implementation. The next step is to use a case to describe each of the identified barriers, to provide some hint to highlight the knowledge integration process, and to promote the discussion comparing the current findings with previous studies.

5.1. Structural Barriers

Mahesh and Suresh [48] stated that recently the role of knowledge in improving effectiveness, quality and growth in the organization have been critical as well as to be aware of the structural deficiencies have led to a significant focus and investment in knowledge management. Organizational structure is vital for how it harnesses the knowledge, and strategically directs it towards agility and competitiveness [49]. Therefore, it is very important to know the organizational structure existent in the organization before the ERP implementation to prevent possible knowledge integration problems that could appear. The main structural barrier was that organizational structure limits the interaction among different functional areas, and this fact hinders the knowledge integration process.

This problem was analyzed through informal discussions and numerous brainstorming sessions with key users and external consultants. As a result, stronger common knowledge links were found, fostering social relationships among the users and the consultant team. These relationships were crucial to the identification of the whole complexity of the organizational structure and to determine the implementation requirements later. Moreover, the level of efficiency reached in the ERP

implementation process depends on how the organizational structure aligns with the nature of the tasks performed by members. In addition, not only formal structures, but also informal structures influence the perceptions of and responses to IS implementation efforts and have important organizational consequences [50].

Ross and Vitale [51] found that the majority of their firms surveyed perceived ERP implementation to be extremely disruptive. This situation could be explained because the new system "pushes" organizations to adopt new business processes. In this regard, many organizations fail to forecast and plan for this change because they do not know their real complexity, and also, because rigid and hierarchical organizations inhibit rapid change even when only exists a few layers of bureaucratic strata [49]. In general, ERP systems require formalization and standardization, and this behavior is indeed bureaucratic. Govers and Van Amelsvoort [52] dealt with the question whether the introduction of ERP system promotes bureaucratization within organizations, suggesting that the implemented ERP system could generate an increased bureaucratic effect on adopting organizations because they obtain an increase of formalization, standardization and centralization as well as a decrease of hierarchization and specialization.

In order to create a situation in which ERP system supports diminish of bureaucratization and increment of business agility, the ERP system must be diffused by means of a variety approach instead of uniformity approach [53], [54]. In this regard, Hammer [55] argued that the ERP implementation is an integrative mechanism that connects diverse departments establishing integrated processes. Boudreau and Robey [56] incorporated the logic of opposition in which stakeholders pose resistance to systems that imposes different standards to which they were accustomed. In this sense, ERPs can constrain organizational activities, and more importantly, can constrain the cognitive frames of organizational members [11]. In this case, the independency of departments had resulted in diversity of interest and competencies in specific knowledge areas [32], which means a power struggle to meet the needs of each department independently, without taking into account the general welfare of the organization and without understanding the impact of each requirement in the process of others.

In a previous study, Pan et al. [31] argued that key users, who were being consulted informally, could form strategic groups to facilitate and enhance the value of their individual knowledge embedded within organizational practices and processes. They found that these communities were very useful as they helped develop and spread better ERP practices faster by connecting "hubs of knowledge" and facilitating the processes so that they became self-organizing, knowledge sharing networks of collaborative learning communities. This result can be explained because organizational isomorphism increases organizational legitimacy [57]; hence, shared knowledge promotes a common vision, giving legitimacy to ERP "best-practices" and making easier their integration in the organizational logic. In this study, these kinds of groups were formed after the appearance of the first knowledge integration problem because the consultant team detected that there was a need to build a new organizational structure to support the ERP implementation process.

5.2. Technological Barriers

The main technological barrier emerged because IS's people within the systems department were the authors of the previous system, and they had problems to understand and maintain easily the new ERP system. They were not comfortable providing support to ERP users because they had not internalized the routines necessary to support the new enterprise system as well as they were stuck in their old procedures and applications, and this situation was perceived by users who did not feel safe asking for support to IS's people. The integration process is often met with obstacles because organizations should be aware that knowledge is frequently tacit and embedded within routines, of which few are stand-alone [58]. In this sense, IS's people had a huge amount of tacit knowledge, which had been reflected into different isolated applications working in different departments.

This problem was analyzed in formal meetings with the consultant team, the IS department of the company, and the key functional users of each department. In these meetings the goal was "translate" tacit knowledge, embedded in IS's people and key functional users, into the ERP logic to facilitate the understanding of the new system, allowing users could more easily learn the new features of the new enterprise system by relating them with those in legacy systems. A better understanding of the new ERP gave legitimacy to IS's people, enhancing their prestige within the user community and improving the relationship among them. Therefore, the development of routines that coordinate the work-related efforts of consultants, key functional users, and IS's people in the organization facilitated knowledge integration because they had the opportunity to habituate automated patterns of interaction, and hence allow for the integration of knowledge required for task performance [59].

The second technological barrier was the parallel use of legacy systems. Mitleton-Kelly [60] considers that new systems may quickly become 'legacy systems' in the sense that they do not meet the full requirements of the users and are unable to fully support business evolution. Furthermore, most of the legacy systems do not use a Relational Database Management System (RDBMS); they still use proprietary flat file systems [61]. The reason for this is simple: there is no central ownership of data or information items in use by these companies. This situation often leads to a rapid growth of different information models, where every part of the organization has its own view on that same information, with differences in structure and even in the semantics of these information models [62]. In this particular case and as it was commented above, the company had islands of information with different programs that fulfill different tasks. This context promoted the comparison between the legacy systems and the ERP system as well as a considerable duplication of effort. According to Wan et al. [17], most of the users seem to be interested in how consistent and similar the new ERP was when compared to the legacy systems. Therefore, users did not focus on learn the use of the new ERP system and integrate their knowledge with it, but they wasted their time performing a double job to keep both systems updated.

Holland and Light [63] argued that legacy systems have embedded current business processes, organization structure, culture, and information technology of the adopter organization. Nah et al. [64] highlighted that to be successful, ERP

implementation efforts must overcome issues of complexity arising from business and IT legacy systems. However, the integration of software is not an easy task, and should be managed properly to integrate the legacy systems and the ERP systems [65]. This problem was solved with the use of legacy systems only for validation purposes. Since ERP modules, processes or reports were validated, users will only have access to the ERP environment for their daily work. This solution reduces the workload in terms of duplication of efforts. Additionally, users will focus only in the ERP system; this means a reduction of the comparisons with the legacy systems, an increment of the users' productivity, and a possibility to integrate user knowledge in the ERP system.

5.3.   Intellectual and Socio-emotional Barriers

These dimensions are complementary because they deal with different characteristics of human beings and considering them together, not only the author can better identify the problematic with which he faced, but also he can raise a more comprehensive solution. The intellectual dimension is related with the learning and knowledge of users, and the socio-emotional dimension considers the feelings and the willingness to improve skills of the users. The main barriers in these dimensions were: knowledge transfer between the legacy system and the new ERP system, and between consultants and ERP users; ERP users were trying to make sense of the change; and individual knowledge was isolated in organizational silos.

Much of the organizational knowledge was embedded in legacy systems and in individual users of every area, making it inaccessible by the new ERP system; hence, it is crucial to understand and share this embedded knowledge to ensure successful knowledge integration. Harrison and Leitch [66] highlight the importance of creating knowledge-enabling structures around the existing information systems for enabling intra-organizational knowledge transfer and sharing because shared vision and systems are likely to contribute to organizational knowledge transfer [67]. This perspective considers the intellectual dimension as a driver of the change in the users' mentality.

According to Ko et al. [68], not much is known about knowledge transfer from consultants to ERP users, in which the knowledge structure of the participants is asymmetric. Initially, the consultant primarily possesses technical knowledge, whereas their clients, future ERP users, primarily possess business knowledge [69]. Hence, the knowledge initially possessed by the consultant must be integrated and embodied [70] in the knowledge of the ERP users [71], [72]. In this sense, every participant has certain knowledge to share, bringing different levels of understanding of current processes as well as ERP processes [73]. Such shared understanding removes barriers, allowing both parties to minimize disagreements and enhance their ability to work together for effectively transferring knowledge. Alavi and Leidner [74] suggested that only individuals with a requisite level of shared knowledge can truly exchange knowledge. This homogeneity of knowledge (i.e., isomorphism) leads to a prevalence of certain institutional logics, giving them legitimacy [75, p. 132].

The concern about users preferring old procedures and not adapting to the new ERP environment was prevailing [72]. Cohen and Levinthal [76] suggested another

explanation for this behavior, users may not be resisting to the change, rather than they are trying to make sense of the change. Learning problems can be explained because users filter the knowledge they exchange, interpreting the knowledge from their own frame of reference [77]. This approach is related with the socio-emotional dimension because users need to justify that these changes are better for them. Several managers surveyed in Ross and Vitale's [51] study admitted that they underestimated the impact that the ERP system had on individuals; and, most managers said that if they could go back, they would offer more training on how the system changes business processes. Robey et al. [9] cited user training as a key requirement for ERP implementation, and those firms, which invested wisely in training, successfully overcame socio-emotional barriers involved with the ERP implementation. However, there are different approaches of the training provided in terms of the kind and the amount; hence, training should address not only new software procedures but also change management issues and concepts of process orientation [9]. Therefore, taking into account these suggestions, the next step was the improvement of users training to enhance the justification that changes are beneficial to everyone because now users know how their work fits into the whole processes of the company.

Finally, the last barrier to overcome was the individual knowledge isolated in organizational silos. The suggested solution was the identification and definition of new procedures and functions to shift the user perspective from the individual level to the organizational level. This means that to reach the knowledge integration process across the organization, there was a need to map the existing knowledge into the ERP functionality. Moreover, this new vision of the firm "as a whole" reduces the perception of the new ERP system as a bureaucratic tool, and promotes exchanges of information among departments to increase collaboration and knowledge integration in the organization. Hansen [78] has defined it as more personalized approach to knowledge. Furthermore, Pan et al. [31] suggest that ERP team members must instigate a process of relationship building through increased information sharing and social interaction among users. This behavior promotes the structural integration to improve knowledge integration through users' willingness to share information and ideas in the form of political transparency or process de-layering [17].

5.4. An Institutional Model of ERP Knowledge Integration

According to the evidence shown above, the author has identified three knowledge integration barriers, which are the pillar of the proposed theoretical model that is shown in Figure 1. In this model, ERP "best-practices" will be the result of decisions made by organizations across time and progressively constrain the actions that employees can perform. ERP "best-practices" constrain social practices in organizations to become isomorphic with other organizations that are using similar technologies [11]. In this sense, ERP implementation redefines organization's perspective because it constrains the existence of divergent views [79]. Therefore, ERPs may embody powerful institutional logics that will constrain the activities of organizational actors [11]; but at the same, their logic will be (re)shaped across time based on the evolution of institutional logics and the appearance of new requirements.
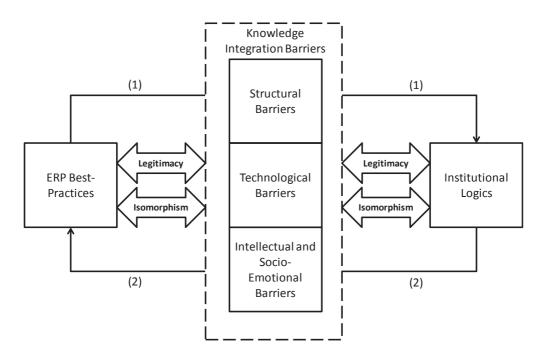
Figure 1. Institutional Model of ERP Knowledge Integration.

This study shows two types of processes of institutionalization: (1) processes that challenge knowledge integration barriers by embedding ERP "best-practices" in the expected formal functioning of the organization as well as in the routines and habits of employees; and (2) processes that operate as drivers of evolution and change by embedding the institutional logics and new requirements within ERP "best-practices". These findings are aligned with Baptista's results [80], who offer a distinct view of institutionalization as a process of generation of institutionalized behavior through the gradual embedding of technology in the daily activities of employees in an organization. At the same time, the process of institutionalization is associated with legitimacy and the embeddedness of institutional logics towards a process of conformity, isomorphism, and homogeneity [81].

ERP implementations should be characterized by legitimacy battles between old and new technologies and shifting evaluation criteria [82]. Until one of them wins, the set of evaluation criteria remains unclear and technology choices need to be legitimized through mimetic means [11]. In this sense, in an ERP context, legitimacy and isomorphism go together as a way of justified the business processes that will be implemented; and isomorphism is reached later as a consequence of homogenization and use of ERP "best-practices". Finally, because of a dominant logic that elicits an isomorphic response [83]; institutional logics gain legitimacy through isomorphism and create new organizational forms and managerial practices [84] that will be incorporated in a new set of ERP "best-practices".

6.   Conclusions and Further Research

According to Wan et al. [17], very little is known about how an organization integrate external knowledge embedded in a new ERP system, a process that implies significant contextual, social and cultural changes. Therefore, this research study contributes to the knowledge management and ERP literature providing managers with different knowledge integration barriers that appear during ERP implementation, and how authors, using an AR methodology, proposed solutions to these problems. In this sense, Robey et al. [85] identified AR as a mean for overcoming knowledge barriers because this approach could deal with the problem of increasing learning during ERP implementations [9].

Organizational studies are frequently based only on retrospective analysis of successful institutional change, paying less attention to how meanings, practices, and structures interact among them in the real life [86]. For that reason, institutional theory needs to reinforce its connections to individuals and organizations in their respective fields of study with the aim to foster its relevance as well as to revitalize its theoretical development [37]. This study took this opportunity to combine institutional theory and action research as a way to connect a theory broadly applied in academic environments with real world issues, offering a more complete picture of what really happens in ERP implementations from the point of view of knowledge integration problems.

In this study, a key issue to deal with structural barriers was the promotion of new organizational structures; these strategic groups were formed after the appearance of the first knowledge integration problem to support the ERP implementation process. In term of technological barriers, IS's people were reinforced in their knowledge related with the new ERP system, and legacy systems were used only for validation purposes. For intellectual and socio-emotional barriers, there was an improvement in the transfer of knowledge between consultants and ERP users; ERP users were provided with more holistic training to make sense of the changes generated by the new enterprise system; and individual knowledge was shared among different users, promoting collaboration among departments. Finally, the training with a holistic vision is an ignored frequent issue that most of the ERP projects must consider to increase the likelihood of success of the ERP implementation. Therefore, this is a promising path to further researches.

The main limitation in this research study is inherent to a qualitative approach, which demands caution for the generalization of the findings due to specificities of the analyzed research setting. In this sense, there is an opportunity to compare these results with studies in other contexts in order to prepare a more complete model that could be applied, for example, in other developing countries with similar characteristics. Therefore, this inquiry should be seen as a starting point for more ambitious research projects, involving a joint and collaborative effort of academics from various countries and disciplines, which will result in the growth of this research field.

References

[1]   T. Davenport, *Mission Critical: Realizing the Promise of Enterprise Systems*. Boston, MA: Harvard Business School Press, 2000.

[2]   A. Amid et al., "Identification and classification of ERP critical failure factors in Iranian industries," *Inform. Syst.*, vol. 37, no. 3, pp. 227-237, 2012.

[3]   V. A. Mabert et al., "Enterprise resource planning: managing the implementation process," *European J. of Operational Research*, vol. 146, no. 2, pp. 302-314, 2003.

[4]   P. Mandal and A. Gunasekaran, "Issues in implementing ERP: a case study," *European J. of Operational Research*, vol. 146, no. 2, pp. 274-283, 2003.

[5]   E. J. Umble et al., "Enterprise resource planning: implementation procedures and critical success factors," *European J. of Operational Research*, vol. 146, no. 2, pp. 241-257, 2003.

[6]   T. C. Loh and S. C. L. Koh, "Critical elements for a successful enterprise resource planning implementation in small and medium-sized enterprises," *Int. J. of Prod. Research*, vol. 42, no. 17, pp. 3433-3455, 2004.

[7]   J. R. Muscatello et al., "Implementing enterprise resource planning (ERP) systems in small and midsize manufacturing firms," *Int. J. of Operations & Prod. Manage.*, vol. 23, no. 8, pp. 850-871, 2003.

[8]   B. Snider et al., "ERP implementation at SMEs: analysis of five Canadian cases," *Int. J. of Operations & Prod. Manage.*, vol. 29, no. 1, pp. 4-29, 2009.

[9]   D. Robey et al., "Learning to Implement Enterprise Systems: An Exploratory Study of the Dialectics of Change," *J. of Manage. Inform. Syst.*, vol. 19, no. 1, pp. 17-46, 2002.

[10] A. Pishdad and A. Haider, "ERP institutionalization: exploring the influential factors," *J. of Enterprise Inform. Manage.*, vol. 26, no. 6, pp.642-660, 2013.

[11] S. Gosain, "Enterprise Information Systems as Objects and Carriers of Institutional Forces: The New Iron Cage?," *J. of the Assoc. for Inform. Syst.*, vol. 5, no. 4, pp. 151-182, 2004.

[12] R. Alvarez and J. Urla, "Tell me a good story: using narrative analysis to examine information requirements interviews during an ERP implementation," *Database for Advances in Inform. Syst.*, vol. 33, no. 1, pp. 28-52, 2002.

[13] N. Talbert, "Getting the most from an enterprise system," *Sloan Manage. Review*, vol. 44, no. 1, p. 11, 2002.

[14] J. Esteves and V. Bohorquez, "An Updated ERP Systems Annotated Bibliography: 2001-2005," *Communication of the Assoc. for Inform. Syst.*, vol. 19, no. 1, Article 18, 2007.

[15] J. Nwankpa, "ERP system usage and benefit: A model of antecedents and outcomes," *Comput. in Human Behavior*, vol. 45, pp. 335-344, 2015.

[16] T. S. H. Teo and A. Bhattacherjee, "Knowledge transfer and utilization in IT outsourcing partnerships: A preliminary model of antecedents and outcomes," *Inform. & Manage.*, vol. 51, no. 2, pp. 177-186, 2014.

[17] A. Wan et al., "Barriers to ERP Implementation: An Action Research," in Proc. Pacific Asia Conf. Information Systems (PACIS), 2001.

[18] T. B. Jensen et al., "Using institutional theory with sensemaking theory: a case study of information system implementation in healthcare," *J. of Inform. Technology*, vol. 24, no. 4, pp. 343-353, 2009.

[19] P. S. Tolbert and L. G. Zucker, "The Institutionalization of Institutional Theory," in *Handbook of Organization Studies*, S. Clegg et al., Eds. Thousand Oaks, CA: Sage Publications Inc, 1996, pp. 175-190.

[20] M. Mignerat and S. Rivard, "Positioning the institutional perspective in information systems research," *J. of Inform. Technology*, vol. 24, no. 4, pp. 369-391, 2009.

[21] J. Y. Son and I. Benbasat, "Organizational buyers' adoption and use of B2B electronic marketplaces: Efficiency- and legitimacy-oriented perspectives," *J. of Manage. Inform. Syst.*, vol. 24, no. 1, pp. 55-99, 2007.

[22] P. J. DiMaggio and W. W. Powell, "The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields," Amer. Sociol. Review, vol. 48, no. 2, pp. 147-160, 1983.

[23] S. R. Barley and P. S. Tolbert, "Institutionalization and Structuration: Studying the links between action and institution," *Organization Stud.*, vol. 18, no. 1, pp. 93-117, 1997.

[24] D. Robey and M.-C. Boudreau, "Accounting for the contradictory organizational consequences of information technology: Theoretical directions and methodological implications," *Inform. Syst. Research*, vol. 10, no. 2, pp. 167-185, 1999.

[25] P. Poba-Nzaou et al., "Motivations underlying the adoption of ERP systems in healthcare organizations: Insights from online stories," *Inform. Syst. Frontiers*, vol. 16, no. 4, pp. 591-605, 2014.

[26] M. B. Dunn and C. Jones, "Institutional logics and institutional pluralism: The contestation of care and science logics in medical education 1967–2005," *Administ. Sci. Quart.*, vol. 55, no. 1, pp. 114-149, 2010.

[27] N. Berente and Y. Yoo, "Institutional Contradictions and Loose Coupling: Postimplementation of NASA's Enterprise Information System," *Inform. Syst. Research*, vol. 23, no. 2, pp. 376-396, 2012.

[28] R. M. Grant, "Toward a knowledge-based theory of the firm," *Strategic Manage. J.*, vol. 17, Winter Special Issue, pp. 109-122, 1996.

[29] P. S. Adler and B. Borys, "Two Types of Bureaucracy: Enabling and Coercive," *Administ. Sci. Quart.*, vol. 41, no. 1, pp. 61-89, 1996.

[30] V. Bohorquez and J. Esteves, "Acquiring external knowledge to avoid wheel re-invention," *J. of Knowledge Manage.*, vol. 17, no. 1, pp. 87-105, 2013.

[31] S. L. Pan et al., "Knowledge integration as a key problem in an ERP implementation," in Proc. Int. Conf. Information Systems (ICIS), 2001.

[32] G. Pisano, "Knowledge, Integration, and the Locus of Learning: An Empirical Analysis of Process Development," *Strategic Manage. J.*, vol. 15, Winter Special Issue, pp. 85-100, 1994.

[33] I. Nonaka, "A Dynamic Theory of Organizational Knowledge Creation," *Organizational Sci.*, vol. 5, no. 1, pp. 14-37, 1994.

[34] J. C. Huang et al., "Knowledge Integration Processes within the Context of Enterprise Resource Planning (ERP) Systems Implementation [Case Study]," in Proc. European Conf. Information Systems (ECIS), 2001.

[35] J. Nwankpa and Y. Roumani, "Understanding the link between organizational learning capability and ERP system usage: An empirical examination," *Comput. in Human Behavior*, vol. 33, pp. 224-234, 2014.

[36] L. Lin et al., "A sender–receiver framework for knowledge transfer," *MIS Quart.*, vol. 29, no. 2, pp. 197-219, 2005.

[37] G. Dover and T. B. Lawrence, "A Gap Year for Institutional Theory: Integrating the Study of Institutional Work and Participatory Action Research," *J. of Manage. Inquiry*, vol. 19, no. 4, pp. 305-316, 2010.

[38] R. L. Baskerville and M. Myers, "Special Issue on Action Research in Information Systems: Making IS Research Relevant to Practice-Foreword," *MIS Quart.*, vol. 28, no. 3, pp. 329-335, 2004.

[39] M. Elden and R. F. Chisholm, "Emerging Varieties of Action Research: Introduction to the Special Issue," *Human Relations*, vol. 46, no. 2, pp. 121-142, 1993.

[40] R. L. Baskerville and A. T. Wood-Harper, "A Critical Perspective on Action Research as a Method for IS Research," *J. of Inform. Technology*, vol. 11, no. 3, pp. 235-246, 1996.

[41] D. West et al., "Action Research and IS Research," in *Critical Issues in Systems Theory and Practice*, K. Ellis et al., Eds., New York, NY: Plenum Press, 1995.

[42] K. Braa and R. Vidgen, "Interpretation, Intervention and reduction in the organizational Laboratory: A framework for in-context information system research," *Accounting, Manage. & Inform. Technology*, vol. 9, no. 1, pp. 25-47, 1999.

[43] J. McNiff et al., *You and Your Action Research Project, 2*nd ed., London, UK: Routledge Falmer, Taylor and Francis Group, 2003.

[44] P. Coughlan and D. Coghlan, "Action Research for Operations Management," *Int. J. of Operations and Prod. Manage.*, vol. 22, no. 2, pp. 220-240, 2002.

[45] D. J. Greenwood, *Action Research - From Practice to Writing in an International Action Research Development Program*, London, UK: John Benjamins Publishing Company, 1999.

[46] H. Bradbury and P. Reason, "Action research: An opportunity for revitalizing research purpose and practices," *Qualitative Social Work*, vol. 2, no. 2, pp. 155-175, 2003.

[47] L. S. Luscher and M. W. Lewis, "Organizational change and managerial sensemaking: working through paradox," *Academy of Manage. J.*, vol. 51, no. 2, pp. 221-240, 2008.

[48] K. Mahesh and J. K. Suresh, "Knowledge criteria for organization design," *J. of Knowledge Manage.*, vol. 13, no. 4, pp. 41-51, 2009.

[49] M. Mohamed et al., "Applying knowledge management principles to enhance cross-functional team performance," *J. of Knowledge Manage.*, vol. 8, no. 3, pp. 127-142, 2004.

[50] M. N. Ravishankar et al., "Examining the Strategic Alignment and Implementation Success of a KMS: A Subculture-Based Multilevel Analysis," *Inform. Syst. Research*, vol. 22, no. 1, pp. 39-59, 2011.

[51] J. W. Ross and M. R. Vitale, "The ERP Revolution: Surviving vs. Thriving," *Inform. Syst. Frontiers*, vol. 2, no. 2, pp. 233-241, 2000.

[52] M. Govers and P. Van Amelsvoort. (2007). *ERP computerisation and limiting bureaucracy: reality or illusion?* [Online]. Available: http://www.archypel.com/pages/download/ERP_and_limiting_bureaucracy.pdf

[53] J. P. Allen, "Value conflicts in enterprise systems," *Inform. Technology & People*, vol. 18, no. 1, pp. 33-49, 2005.

[54] L. E. Wagner and S. Newell, "'Best' for whom?: the tension between 'best practice' ERP packages and diverse epistemic cultures in a university context," *The J. of Strategic Inform. Syst.*, vol. 13, no. 4, pp. 305-328, 2004.

[55] M. Hammer, "How Process Enterprise Really Works," *Harvard Bus. Review*, vol. 77, no. 6, pp. 108-111, 1999.

[56] M.-C. Boudreau and D. Robey, "Enabling organizational transition with complex technologies: Understanding the post-implementation learning," presented at Academy of Management Annual Meeting, Washington, DC, 2001.

[57] D. L. Deephouse, "Does Isomorphism Legitimate?," *Academy of Manage. J.*, vol. 39, no. 4, pp. 1024-1039, 1996.

[58] F. Blackler, "Knowledge, Knowledge Work and Organizations: An Overview and Interpretation," *Organization Stud.*, vol. 16, no. 6, pp. 1021-1046, 1995.

[59] C. J. G. Gersick and J. R. Hackman, "Habitual routines in task performing groups," *Organizational Behavior and Human Decision Process*, vol. 47, no. 1, pp. 65-97, 1990.

[60] E. Mitleton-Kelly, "IT Legacy Systems: Enabling Environments that Reduce the Legacy Problem: A Complexity Perspective," in Software Evolution and Feedback - Theory and Practice, N. H. Madhavji et al., Eds. West Sussex, UK: John Wiley & Sons Ltd, 2006.

[61] I. Michiels et al., "Identifying Problems in Legacy Software: Preliminary Findings of the ARRIBA Project," in Proc. Elisa ICSM workshop, 2003.

[62] K. Vandenborre et al., "Coherent enterprise information modelling in practice," in Proc. 13th European-Japanese Conf. Information Modeling and Knowledge Bases, Kitakyushu, Japan, June, 2003.

[63] C. Holland and B. Light, "A critical success factors model for ERP implementation," *IEEE Softw.*, vol. 16, no. 3, pp. 30-36, 1999.

[64] F. Nah et al., "ERP implementation: chief information officers' perceptions of critical success factors," *Int. J. of Human-Comput. Interaction*, vol. 16, no. 1, pp. 5-22, 2003.

[65] E. Ngai et al., "Examining the critical success factors in the adoption of enterprise resource planning," *Comput. in Ind.*, vol. 59, no. 6, pp. 548-564, 2008.

[66] R. Harrison and C. M. Leitch, "Learning and Organization in the Knowledge-based Information Findings from a Participatory Action

Research Case Study," *British J. of Manage.*, vol. 11, no. 2, pp. 103-119, 2000.

[67] R. Van Wijk et al., "Inter- and Intra-Organizational Knowledge Transfer: A Meta-Analytic Review and Assessment of its Antecedents and Consequences," *J. of Manage. Stud.*, vol. 45, no. 4, pp. 830-853, 2008.

[68] D.-G. Ko et al., "Antecedents of Knowledge Transfer from Consultants to Clients in Enterprise System Implementations," *MIS Quart.*, vol. 29, no. 1, pp. 59-85, 2005.

[69] I. Rus and M. Lindvall, "Knowledge Management in Software Engineering," *IEEE Softw.*, vol. 19, no. 3, pp. 26-38, 2002.

[70] S. Faraj and L. Sproull, "Coordinating Expertise in Software Development Teams," *Manage. Sci.*, vol. 46, no. 12, pp. 1554-1568, 2000.

[71] M.N. Hainens and D.L. Goodhue, "Implementation partner involvement and knowledge transfer in the context of ERP implementations," *Int. J. of Human Comput. Interaction*, vol. 16, no. 1, pp. 23-38, 2003.

[72] C. Soh et al., "Cultural Fits and Misfits: Is ERP a Universal Solution," *Commun. of the ACM*, vol. 43, no. 4, pp. 47-51, 2000.

[73] W.-H. Hung et al., "Relationship bonding for a better knowledge transfer climate: An ERP implementation research," *Decision Support Syst.*, vol. 52, no. 2, pp. 406-414, 2012.

[74] M. Alavi and D.E. Leidner, "Review: Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues," *MIS Quart.*, vol. 25, no. 1, pp. 107-136, 2001.

[75] M. T. Hannan and J. H. Freeman, *Organizational ecology*. Cambridge, MA: Harvard University Press, 1989.

[76] W. Cohen and D. Levinthal, "Absorptive Capacity: A New Perspective on Learning and Innovation," *Administ. Sci. Quart.*, vol. 35, no. 1, pp. 128-152, 1990.

[77] M. Huysman et al., "Learning from the Environment: Exploring the Relation Between Organizational Learning, Knowledge Management and Information/Communication Technology," in Proc. Fourth Americas Conf. on Information Systems, Baltimore, MD, 1998, pp. 598-600.

[78] M. T. Hansen, "What's your strategy to manage knowledge," *Harvard Bus. Review*, vol. 77, no. 2, pp. 106-111, 1999.

[79] P. Besson and F. Rowe, "ERP project dynamics and enacted dialogue: Perceived understanding, perceived leeway, and the nature of task-related conflicts," *Database for Advances in Inform. Syst.*, vol. 32, no. 4, pp. 47-66, 2001.

[80] J. Baptista, "Institutionalisation as a process of interplay between technology and its organizational context of use," *J. of Inform. Technology*, vol. 24, no. 4, pp. 305-319, 2009.

[81] P. Tingling and M. Parent, "Mimetic Isomorphism and Technology Evaluation: Does Imitation Transcend Judgment?," *J. of the Assoc. for Inform. Syst.*, vol. 3, no. 1, Article 5, 2002.

[82] R. Garud et al., "Orchestrating institutional processes for technology sponsorship: The case of Sun Microsystems and Java," *Academy of Manage. J.*, vol. 45, no. 1, pp. 196-214, 2002.

[83] M. Lounsbury, "A tale of two cities: Competing logics and practice variation in the professionalizing of mutual funds", *Academy of Manage. J.*, vol. 50, no. 2, pp. 289-307, 2007.

[84] R. Greenwood et al., "The Multiplicity of Institutional Logics and the Heterogeneity of Organizational Responses," *Organization Sci.*, vol. 21, no. 2, pp. 521-539, 2010.

[85] D. Robey et al., "Information technology and organizational learning: A review and assessment of research," *Accounting, Manage. and Inform. Technologies*, vol. 10, no. 2, pp. 125-155, 2000.

[86] T. B. Zilber, "The work of meanings in institutional processes and thinking," in *The Sage handbook of organizational institutionalism*, R. Greenwood et al., Eds. London, UK: SAGE, 2008, pp. 151-169.