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Role of process knowledge in business process improvement methodology: a case study

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Abstract

Purpose – The purpose of this paper is to analyse the importance and role of process knowledge in the business process (BP) improvement methodology with the help of a case study.

Design/methodology/approach – The approach takes the form of a literature review that highlights the challenges and issues in the existing BP improvement methodologies. An in-depth case study that has embarked on a major BP improvement initiative that emphasizes individual and collective process knowledge in a real-life complex organization is presented.

Findings – The paper confirms that BP improvement is, in fact, a complex, knowledge-intensive, collaborative process that consists of a set of coordinated, contextualized knowledge management processes. The design of the "to-be" process in this study is a knowledge co-creation process that uses collaborative exploration of different scenarios and contexts. Compared with the traditional BP improvement methodologies where the main emphasis is on the design of a new process model, the focus of the methodology employed in this case study is on the process of knowledge co-creation and transfer.

Research limitations/implications – The paper leads to increased recognition of the knowledge and experience people develop, use and share while modeling, executing, and improving their BPs. It offers anecdotal evidence and general case study research limitations apply.

Practical implications – Practitioners should focus more on key knowledge processes rather than BP models that often obscure the role of individual and collective process knowledge. Rather than investing limited resources in the mapping and modeling of existing processes, practitioners will be able to better serve their organizations if they concentrate on the improvement of the process by tapping the contextualized process knowledge possessed by the individual actors.

Originality/value – In the expanding field of BP management, the study explores the increasing importance of individual and collective process knowledge in process improvement methodologies and provides guidance to user organizations on ways to exploit the value of process knowledge in designing new processes as well as collaborative knowledge sharing and creation process.

Keywords Knowledge management, Business process re-engineering, Research methods

Paper type Literature review

1. Introduction

Increasing competition, changes in stakeholder requirements and new technologies are driving business organizations for rapid and significant changes. In order to respond to such changes and survive in the complex business environment, business organizations are constantly striving to improve and manage their business processes (BPs). While the wide-spread understanding of BP management (BPM) as the process automation technology will remain for quite some time, business leaders are now taking a new holistic approach to BPM that incorporates people, processes, systems, and strategy (Gartner Research, 2006). This holistic approach to BPM has led to

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increased recognition of the knowledge and experience people develop, use and share while modeling, executing and improving their BPs. In fact, knowledge is considered as an integral part of the BP and not something to be managed separately. This process related knowledge is created not only by individuals, but also by groups of people sharing and using their knowledge and experience throughout the BP eco system.

The experiential knowledge owned by individual domain experts as well as the collective "know-how," however, are often neglected during BP improvement projects as they continue to focus on the explicit knowledge that is normally captured by BP models. The problem of BP improvement has often been reduced to a modeling problem, typically performed by a process analyst whose experience is limited to the explicit knowledge expressed by process models. With their grounding in the software development methodologies, many BP improvement methodologies often include phases that closely resemble those of a software development lifecycle. For example, they typically start with analysis and design and finish with BP implementation and post-implementation (phases) that are executed in a sequential order.

In this paper, we argue that BP improvement is a complex, knowledge-intensive, collaborative process that consists of a set of coordinated, contextualized knowledge management (KM) processes. The main objective of this research is to investigate a set of knowledge processes created and used in different phases of a BP improvement initiative in an organization, with a special emphasis on the role of individual and collective knowledge creation and reuse. This project identifies the issues and strategies related to externalization, creation, application, and reuse of process knowledge in a specific e-procurement process improvement initiative currently undertaken in a large multi-unit organization. Using an exploratory case study, this research identifies and describes important research and practical issues created at the crossroads of BP improvement methodology and process-related KM.

2. Literature review

2.1 BP improvement concepts and methodologies

The need to improve customer service, to bring new products and services rapidly to market, and to reduce cost inefficiencies have been pushing BPs to the top of business organizations' priority list (Gartner Research, 2006; Davenport and Short, 1990). BPs are an effective way to manage an organization at any level and eventually support its overall goals. Consequently, they are now considered the most valuable corporate asset (Gartner Research, 2006) and their continuous improvement has become an imperative for many business organizations.

In spite of the increased attention, BP improvement is not a new concept. Rapid advances in information and communication technologies, end-user computing and increasing globalization and competition have all intensified this need for improving business performance. While continuous improvement philosophy and methods have helped in achieving significant improvement in the quality of manufactured products and processes, their effect on BPs has been limited. Even though information technologies were deployed to improve these BPs, results are often disappointing.

The earlier disciplines of "organization and methods" and "operational research" have resulted in many BP improvement methodologies used to this day. Currently, BP improvement covers a continuum from incremental continuous improvement to radical reengineering of the business and its processes. Process reengineering is now

considered obsolete and impractical considering its radical view of redesign, the top-down approach, strong focus on BP automation and past history of failures and problems (Gartner Research, 2006). Other approaches such as process design, process redesign, process improvement, etc. are still alive and widely used by various consultants and practitioners, often under different names.

While improving BPs is well recognized as an imperative need for many organizations, the first and the foremost question asked by the practitioners for initiating such BP improvement is "how?" In other words, they are interested to know what methodologies to follow and which tools to use. In fact, many consultants and software vendors differentiate themselves by the methodology they apply. Improvement methodologies are primarily the field of consulting firms who have developed proprietary BP improvement methods (Kettinger *et al.*, 1997). Even though there are many models, techniques, and tools available for improving the BPs, many authors such as Davenport and Short (1990) argue that process innovation remains more an "art than science" (Davenport, 2005).

In essence, a methodology is a theory that is put in practice with the objective of dealing with real world situations (Preece and Peppard, 1996). It is expected to provide a means of describing the knowledge and experience and to offer certain level of generic structure to the approach for practitioners to employ in their specific business situations. In addition to offering certain level of organization and structure to the approach, methodology is also expected to facilitate understanding of the roles and tasks and identification of the skills required to implement the approach (Adesola and Baines, 2000).

In the revised version of his "what-to-do" book called *Business Process Improvement*, Harrington (Harrington *et al.*, 1997) addressed this "how" question and provided technical procedures for implementing BP improvement in business organizations. This particular approach consists of a six phases – organization, documentation, analysis, design, implementation, and management, and is expected to lead to the implementation of the best-value future-state solution (Harrington *et al.*, 1997). Reviewing various methodologies and tools on process improvement, Povey (1998) observed that the past methodologies were incomplete and generally did not address the implementation issues adequately. While most of the methodologies address the analysis and redesign with some degree of thoroughness, the actual implementation of changes were addressed either superficially or not addressed at all (Povey, 1998). The next section will discuss the issues and challenges with the current BP improvement methodologies.

2.2 Challenges and issues with the current BP improvement methodologies

A methodology is expected to provide a means of generalizing and describing the knowledge and experience and, place that in a structured way that is to some extent transferable to other situations in terms of the roles, tasks and the required skills. Given that each business situation and each BP have unique characteristics, it is difficult to develop and adapt a common universal methodology that is applicable to all types of business situations and contexts and delivers the outcomes in all types of business scenarios and contexts. While there is always an opportunity to learn from the existing successful approaches and practical experiences in case study situations, their adaptation and reuse in a different situation cannot guarantee any degree of

success. Each methodology has its advantages and disadvantages and no single model is the best one for all business situations as they are always contextual.

Requirement to consistently follow a particular approach to process improvement prescribed by a particular methodology that worked well in a different context, may stifle the creativity of people involved in the improvement and actually restrict the opportunities for achieving optimum results. Conforming to the rigid requirements prescribed in a given methodology may be contrary to the improvement philosophy a firm would like to embed in their organizational culture.

Clouded by the undue focus on project management and organizational change aspects, the challenge to develop an improved process is relegated to the bottom in the quest to develop the "best" process improvement "methodology" (Reijers and Limam Mansar, 2005). In order to deal with this challenge, many firms tend to adopt best practices. A "best practice" is a successful way of resolving a particular problem that may need to be adopted in a skillful way to the prevailing conditions. Best practices are collected and applied in various fields such as business planning, healthcare, manufacturing, software development, product design and software implementation (Glovin, 1997; Butler, 1996). In BP reengineering literature also, about 30 best practices are described (Reijers and Limam Mansar, 2005).

Increasingly, this challenge has forced organizations to discover the "best practice business processes" and adopt them to their local business situations rather than deploying a methodology for achieving process improvements. To make things easier for business organizations, some of the software vendors claim that the so-called "best practice" BPs are already embedded in their software solutions. For example, enterprise systems software vendors such as SAP, Oracle, etc. claim that the BPs embedded in their software solutions are typically best practices. These large enterprise resource planning software vendors reportedly investigated BPs across a wide variety of organizations and industries and then modeled the best of them into their software solutions (Bingi *et al.*, 1999; Konicki, 2001; Scheer and Habermann, 2000). With many firms preferring to leave a well-tested configuration of the enterprise system unchanged (Somers and Nelson, 2003), the underlying assumption that the best practice BPs embedded in the software remain "best practice" forever is contrary to the continuous improvement philosophy. This brings the focus back to the improvement methodology that is sustainable and deliver continuous improvements rather than finding an "off-the-shelf" and one-off process improvements enabled by software solutions.

None of the BP improvement methodologies documented in the literature were individually capable of providing a complete methodology. An analysis of various BP improvement methodologies that were currently in use revealed that none of them were robust enough to be able to deliver sustained improvement (Povey, 1998). He has developed a "best of the breed soft business process improvement" model by taking best parts of the existing models into a new model by incorporating a socio-technical approach that balances the technical needs of the process with the cultural needs of the people who execute the process. Similarly, Siha and Saad (2007) developed a general framework based on the analysis of critical success factors from the case-based BP improvement literature. Focusing on four methods such as six sigma, benchmarking, BP reengineering, and process mapping they have identified top management support, effective use of information technology, smart choice of the process to be improved and the importance of knowledge sharing and transferability as the critical success factors

(Siha and Saad, 2007). Though they have highlighted the importance of knowledge sharing and transferability, it predominantly refers to the supply chain and does not consider the role of individual and collective process knowledge.

Sustainability of BP improvement and the currency of the methodologies/models is another challenge. While BP improvement methodologies and tools have helped achieve significant improvement in operational areas, many organizations have found it difficult to sustain over the long term. Lack of sustained commitment by the senior management, lack of continued training and further development, culture clashes, "tick box" approach by senior management in incorporating enablers of process improvement, and lack of structures to stop backsliding are some of the problems affecting the sustainability (Bateman, 2005).

Focus on easily quantifiable and harder elements in the process improvement methodology is another issue. Even though some of these methodologies include "soft" elements such as human relationships, resistance to change, and organizational culture, their focus is on harder and more quantifiable elements of the organization (Adesola and Baines, 2005; Ruessman *et al.*, 1994). Even though many best practices and research papers recognize the importance of human elements and the organizational aspects, they are not included in most of the existing methodologies. Difficulties in modeling these factors into the methodology and inability to generalize the issues across various business situations are some of the reasons for this.

Even though understanding the evaluation and continuous improvement notion and incorporation of human and organizational issues into the BP improvement methodologies are critical success factors, most of the methodologies stop at implementation stage. This seems to be inconsistent with the increasing pressures of an ever-changing world in a highly competitive business environment (Vokala and Rezgui, 2000). Moreover, this is an antithesis to the continuous process improvement philosophy adopted by many business organizations. Application of many of these approaches and methodologies is not feasible due to associated application cost, time required for its implementation and lack of knowledge about their potential benefits (Vokala and Rezgui, 2000). In a business improvement context, it is necessary to evaluate both the process itself as well as the methodology in order to ensure that it is effective when used by practitioners. Thus, several methodologies and tools developed by various experts, academicians and practitioners to help businesses improve their processes, do not seem to adequately support the practitioners through all stages in the BP improvement (Adesola and Baines, 2005).

Another issue is whether the BP improvement methodology does indeed work or not? Many methodologies and tools have been developed both by consultants/experts and researchers without rigorously assessing their usefulness to the practitioners. It is also not clear whether these methodologies and tools, when applied, really contributed to the improvement objectives, were useful to the end-users and, most importantly, whether they were tested elsewhere. Revising the frameworks and methodologies of Davenport and Short (1990), Kettinger *et al.* (1997), Harrington *et al.* (1997) and Childe *et al.* (1994), a new BP improvement methodology that incorporates theory, tools and practices was developed by Adesola and Baines (2000). Even though this methodology was tested by the authors at the time of development in a particular business context, no further work is done. It is not clear how much better this methodology is than the previous methods. As noted by authors (Adesola and Baines, 2000), further testing of

the model based and integrated process improvement methodology with more case studies and a framework that incorporates users' skills into the methodology is essential.

In summary, some methodologies and tools are developed by consultants and are used exclusively by them in their consulting assignments while some other methodologies developed by the researchers are published in the academic journals. What is good for one BP and organizational context may not be acceptable and adoptable to another as many issues including the management style, organizational culture, skill levels of participants and the process characteristics such as complexity, scope, significance, etc. may impact on the adopted BP improvement methodology. Moreover, all of these methodologies are not rigorously tested for their validity across different business situations and therefore are limited in their applicability. In addition, cost effectiveness of the methodology and the ability to adapt a generic methodology to a particular business/industry sector are also not evaluated thoroughly in spite of their significance.

However, in spite of their significant differences, most of the existing BP improvement methodologies in the literature typically consists of some or all of the following stages – development of objectives, problem definition and scoping, process analysis and modeling, redesign, identify change levers/implementation, benchmarking, evaluation, and continuous improvement (Adesola and Baines, 2000; Bateman, 2005). All these stages of BP improvement generally are linear and sequential with varying emphasis on a particular stage of the process of improvement in each of those methodologies. In practice, it is however difficult to visualize a strictly linear and sequential process of achieving BP improvement, especially with the methodologies increasingly incorporating "softer" aspects such as change management and human relationships.

2.3 Knowledge aspects of BP improvement

As already stated, knowledge is considered an integral part of the BP and not something to be managed separately. It is deeply embedded not only in documents, models or formal repositories but also in organizational routines, processes and practices (Amarvadi and Lee, 2005). Organizational knowledge includes both explicit knowledge that can be externalized, documented, codified, shared within the same context and managed by technology as well as tacit (implicit) knowledge that are deeply embedded in the experience people develop over time. While some aspects of tacit knowledge cannot ever be externalized, some aspects of it can be described and shared usually via collaborative problem solving, sharing of the same experiences, etc. This particular aspect of tacit knowledge is commonly termed "experiential knowledge."

Research in the area of KM also confirms that people develop new practices even when engaged in highly repetitive, routine BPs. Knowledge and especially the process knowledge, is inseparable from individuals and their actions (Davenport and Short, 1990). It is a combination of experience, context, interpretation and reflection, and involves more human participation than information (Davenport, 2005). Reflection upon concepts and the distinctions among them is the essence of the process of "knowing" (Glazer, 1998) and hence makes it inseparable from individuals. This also means that knowledge, and especially its tacit aspect, is not something that can be "bottled," stored and pushed around by technology in order to be delivered to the right

people at the right point of time, as promoted by the so-called "Technology-Push Model of KM" (Malhotra, 2005).

We argue that any BP improvement process is, in fact, a knowledge intensive process as all decisions about activities and tasks to be performed implicitly and explicitly deal with process-related knowledge. The structure of a process represents only one aspect of this knowledge derived from the organizational procedures and rules used to specify sequencing of activities, the way activities exchange information and the way processes join and branch out (Bera *et al.*, 2005). The need therefore to understand and appreciate the role of KM within the context of process redesign and/or improvement initiatives and the way knowledge is to be integrated with the BP is imperative (Smith and McKeen, 2004).

The process orientation implicit in the process knowledge that is possessed by the owners and users will facilitate process improvement (Reijers, 2003). Therefore, involvement of individuals in process improvement initiatives will allow them to exploit their core talents, skills, process knowledge and experience, and leverage them into process improvements (Beckett, 2004). This involvement, will in the long run increase the coordination of each individual's efforts with the company's business operations in their day-to-day execution. In fact, the embedded practices and norms at the operational level characterized by the process knowledge will help sustain beneficial outcomes of the process improvement (Beckett, 2004).

In fact, most of the business improvement methodologies do not consider process knowledge as the focal point (Dalmaris *et al.*, 2007). Though recent studies have noted the benefits of incorporating knowledge considerations into BP improvements (Seely, 2002) and proposed some approaches and applications (Kim *et al.*, 2003; Papavassilou *et al.*, 2003; Remus and Schub, 2003), their efforts were neither systematic nor applicable to a wide range of BPs (Dalmaris *et al.*, 2007). Dalmaris *et al.* (2007) developed a framework with process knowledge as its fundamental component with focus on how knowledge is managed and embedded in the process. It, however, has focused on achieving improvements in the process under investigation by managing the knowledge within that process, rather than on the "methodology."

Furthermore, inadequate importance attributed to the BP knowledge among the individuals especially in administration and services sector that heavily involve knowledge-based activities is one of the major reasons for the failure of BP improvement projects (Smith and McKeen, 2004). In addition to this, inability of the organizations in developing predictive dynamic models for evaluating the effects of designed process improvements before implementation have also contributed to these failures. While simulation models are successfully used in manufacturing process contexts to analyze the scenarios and arrive at informed recommendations for improvement (Giaglils, 2001), not much experience and knowledge is available about the BPs in services and administrative sector.

In summary, experiential knowledge owned by individual domain experts, is often neglected during BP improvement projects as companies often adopt the model-based approach that focuses on control-flow models, coordination mechanisms, rules, and policies – in essence, the explicit knowledge. With emphasis decisively shifting towards the evaluation of the improvements (outcomes) as well as the process or methodology of achieving improvements, the inseparable link between the individual/collective

knowledge of the stakeholders in the project and the BP under investigation, is expected to have significant influence on both the process as well as the outcomes.

3. Research methodology

3.1 Research questions and methods

The main objective of this research is to investigate a set of knowledge processes created and used in different phases of a BP improvement initiative in an organization, with a special emphasis on the role of individual and collective knowledge creation and reuse. More precisely, in a specific e-procurement process improvement initiative currently undertaken by the BPM team in a large university, we aim to identify and document the issues/strategies/practices related to influence of process knowledge possessed by individual participants. The main research question this study investigates is:

RQ1. What are the main knowledge processes used in different phases of BP improvement methodology and what is the influence of individual/collective process knowledge?

In line with the exploratory nature of this research, a case study method that involved an interpretive approach was adopted to capture its corresponding contextual richness and complexity Yin (2003). Interpretive research offers an opportunity to understand the phenomena through the meanings that people assign to them (Deetz, 1996). This project used an exploratory, case study research method to investigate the BP improvement methodology developed and evolved as the BPM project progressed from its inception to completion.

In order to capture accurate reflection of the issues under investigation and the evolution of business improvement methodology in this context, semi-structured interviews with the stakeholders and facilitators of the project were conducted. In addition, the research team participated in the process improvement workshop as non-participant observer, and observed the evolving methodology and the interacting and facilitating factors in the final outcome. In addition, information that relate to the origin and history of this project, its plan of action, minutes of the previous meetings and workshops, and other policy related documents were collected and content analyzed. Like all interpretive studies, this study sought a subjective understanding of the conditions, practices, and consequences of social action as expressed by the stakeholders and facilitators in their particular social context and are expected to reveal complexities and details that are commonly omitted in quantitative studies Mason (2002). The data thus collected from different sources was compared and triangulated in order to identify the development and evolution of the BP improvement methodology in this context.

As is typical in any case study research, this study had limitations, including lack of generalizability and subjective bias (Yin, 2003; Mason, 2002). The findings of this study were specific to the situation observed and provide anecdotal evidence. Since the BP improvement methodology and process knowledge of individuals in the project is continuously evolving and changing, it was possible that the influence of process knowledge on certain aspects could not be seen immediately, and may become apparent only after a long period of time (Willcocks and Lester, 2002). The limitations discussed above could thus have influenced the process as well as the outcomes of this study.

However, these limitations are unlikely to have affected the validity and reliability of the outcomes significantly because the objective of the study was not to generalize, but to provide anecdotal evidence and illustrate the role of process knowledge in this particular project.

3.2 Case study organization and context

The case study organization, chosen for this research, is a large university that employs about 6,000 staff. The e-procurement BP improvement project, investigated in this study, is being implemented in a large faculty that employs about 200 people. The faculty consists of a number of organizational units including academic departments, research centres, and other commercial units. The specific process improvements emerging from this project along with the evolving BP improvement methodology are expected to be rolled over to other faculties in time. The study was conducted during the year 2006-2007 and is currently in the final stage. This particular organization was selected because of the access given to the researchers, its potential as a rich organizational context in which to study the influence of process knowledge and the evolving nature of the process improvement methodology in a BPM implementation context.

The e-procurement BP (also known as "purchase-to-pay") is one of the core operational processes in any organization. In essence, it is a very simple repetitive, standard BP designed to coordinate the main activities related to procurement of goods and services from a supplier, their receipt and storage and subsequent payment in this organization. Thus, it typically includes the following high-level tasks: "select the vendor, order goods and services," "receive goods and services," and "make payment." This case study organization, because of the diversity of its operations and faculties, procures many different types of goods and services ranging from radio-active materials to computers, stationery, human cells, bacteria, etc. While majority of the items are consumables specific to a particular research project or other purposes, some of them, however, need to be registered and subsequently managed as company assets for insurance and depreciation purposes (e.g. equipment costing more than $5,000).

In this particular organization, asset management has been a very complex problem and this mainly due to a very diverse nature of assets procured by different organizational units. For example, while some of the asset types were virtually the same across all units (e.g. computers), in many instances different units had to acquire and manage very diverse types of assets. Some of them would require special storage and safety procedures in place (e.g. radioactive substances). Some would even require the specialist knowledge to check the working order of a received asset (e.g. a very sophisticated piece of equipment) and specialist procedures to receive, store and handle them for use, reuse and disposal, and to determine its usage life. In many such instances, the person who actually selects the supplier, receives the material, inspects the quality of the material and approves payment may be the individual researcher. For these individual researchers, procurement is just a one-off activity and even if it is to be repeated, the frequency could be once or twice a year. Thus, the role of various individual experts/researchers and technicians and their knowledge of the material is far more important in the entire procurement process than the understanding and awareness of the generic process steps and is reflected in the existing variety of

procedural steps, policies, variations and other idiosyncrasies in the procurement process.

3.3 E-procurement BP and context

The e-procurement BP improvement initiative started as a part of a much larger initiative to standardize operational processes that, in turn, is expected to enable implementation of a concept of shared business services. From the business value perspective, this will enable different units to share assets, improve bargaining power with suppliers, streamline the processes and most importantly better utilize knowledge, expertise and experience of people involved in this BP as well as other organizational processes. With this aim, the BPM team has initiated this improvement project as a first step. The transfer of knowledge and experience acquired in this particular projects to the subsequent projects is critical, in order to make the subsequent projects even more effective.

Even though the e-procurement BP at higher levels remained the same (in terms of its main tasks and control flows) across different units within the same faculty, over time, the underlying organizational practices and policies have evolved and changed. This was followed by development and acquisition of different applications used to manage different aspects of e-procurement process. In particular, very diverse asset types led to development and implementation of different asset management applications designed to meet the diverse needs of different units. The added complexity of the type of assets purchased and the specialist knowledge and handling procedures required for each of the research projects evolved over time also contributed to the development of several non-standard and idiosyncratic procedures and processes.

In addition to this, the number of individual researchers, technicians, lab assistants and administrative staff, and several other temporary research assistants who are required to carry out some of the steps in the overall procurement process from time to time as a part of their duties, have also contributed to additional complexity and challenges. Thus, the procurement process has grown over years into a very diverse process in the organization with several variations and procedures. Even though the objective is not to standardize the e-procurement process blindly, the organization is embarking on improving and developing an online e-procurement process that can consistently deliver the outcomes and cater to the varying requirements and variety of contexts and scenarios. Obviously, this is a very challenging task not only because of the underlying infrastructure, but also because of different organizational contexts including different organizational culture, information management and change management practices as well as organizational policies and practices.

4. Analysis, findings and discussion

This section offers an analysis and summary of key research findings. It focuses on knowledge processes used in different phases of BP improvement including co-creation, transfer and reuse of individual and collective knowledge. It also illustrates how this study expands the boundaries of BPM research and offers insights into the role played by participants' process knowledge in the actual improvement of the BP and the methodology adopted in this case study organization.

4.1 BP improvement methodology used in case study organization

With an objective of developing an "as-is" model, typical BP improvement methodology normally start with the analysis and modeling phase. This BP modeling typically involves acquisition and transfer of explicit knowledge from the domain experts (i.e. people actually executing these processes) to the process analyst. The analyst then proceeds to represent this knowledge by a process model. Obviously, some aspects of this explicit knowledge get lost, first during knowledge codification by the domain experts, in the transfer to the process analyst, and then during process modeling. In the case organization, the improvement started from the analysis phase. The analysis phase, however, involved two sub-phases that can be termed as preliminary analysis and collaborative analysis.

The preliminary analysis involved locating the key domain expertise and understanding the reasons for, and sources of different versions of the same process that evolved over time. Series of workshops with several participants in the process were used as a way to capture this information. The BPM team has conducted series of preliminary discussions with a variety of people within the faculties and outside including academics, finance staff and administrative staff. This process led to the identification of stakeholder groups and their representatives for participation in the workshops. Workshop participants included the "touch points" from each unit as well as the members of senior management and policy makers.

Collaborative analysis involves workshop discussions in which the analysis and collaborative design of the to-be process was carried out. Initially a high-level generic model was presented to the workshop participants as a starter. The objective was not to focus too much on the existing processes, rather to develop a view of what the future processes ought to be. Once the future processes were identified, the plan was to work backwards from there and arrange the existing resources in any way that will achieve the new process. This pragmatic approach was taken, primarily because of the total lack of consistency within and between faculties with regard to the procurement process.

These workshops were prepared and guided by the workshop facilitator who was also one of the leaders of the BPM team. As it is typically the case with collaborative workshops, some preliminary rules were established and discussed at the very beginning to create an environment that encourages, supports and values equal participation. The facilitator by asking the participants to explain how the process and the emerging changes work in their contexts had established the fact that there are inconsistencies in the process. In addition, the workshops were aiming to develop a perspective among the participants about the extent of differences and variation the to-be process can cater to and to eliminate the perception that "one size fits all" approach was taken in the development of to-be process.

4.2 Discussion of the findings

Rather than a sequence of commonly used phases that are primarily focused on BP models and model improvement technique, this research has confirmed our initial view that a BP improvement methodology is a set of coordinated knowledge-management processes. Evidenced in this case study, these processes deal with acquisition (externalization), creation, co-creation, transfer and application of both explicit and most importantly experiential knowledge (i.e. externalized tacit knowledge).

They, however, need to be carefully designed and coordinated in order to best leverage individual and collective knowledge, experience and creativity.

Interestingly, the high-level standard model of this BP was the same across different units though there are significant differences at lower level. Consequently, the main objective for the BPM team was to understand the level of complexity and differences between different "versions" of the same process at the lower level. However, rather than trying to identify and document all different versions of the "as-is" process and the associated policies and then arrive at a consensus process model, this team has relied on the knowledge of key participants. The team therefore first identified the key participants (the so-called "touch points") – people who have the explicit as well experiential knowledge about the key aspects of each version of this BP. Furthermore, the BPM team also used the preliminary analysis phase to gain better understanding of the possible sources of, and reasons for, different versions of the process. These differences occurred because of the different policies and procedures that have evolved over time around these decision-making tasks where key participants were in charge of various semi-structured decision-making tasks in each process. For example, the main differences could be attributed to an important decision: "Is the received good an asset?" and the associated rules used to make this decision in each unit. These rules and the procedures used to differentiate and receive are different in different units.

Therefore, the main objectives of the preliminary analysis phase in this particular project were to locate the key domain expertise and to understand the reasons for, and sources of different versions of the same process that have evolved over time. From the KM perspective, these objectives are very different from those of "traditional" BP analysis and modeling phase that typically focus on knowledge transfer from domain experts, in order to create very comprehensive "as-is" BP models. Thus, this study points out the individual knowledge of the process along with its variations and complexities. Unlike in a typical BP improvement methodology where modeling of the current (as-is) BP is followed by the design of improved (to-be) process, and carried out by the process analyst with varying degrees of end-user participation, this methodology values and incorporates the process knowledge possessed by various actors into the to-be process. By this approach, it will not-only ensure "buy-in" to the proposed process, but also facilitates standardization wherever beneficial to the organization.

This process knowledge (both explicit and implicit) possessed by the individual experts and members in the faculties was mined during the workshops. These workshops thus included all key KM processes – acquisition, co-creation, transfer, and application of both explicit and experiential knowledge. Rather than in a particular sequence, these KM processes were highly intertwined. Furthermore, even though the high-level model was used at the very beginning of the workshop, the main emphasis was not on process modeling. After confirming that the high-level model was indeed the same for all functional units, participants focused on process tasks. Therefore, instead of looking at control-flows between tasks and trying to identify possible problems with for example, process structure, the group focused on each individual task. As expected, the special emphasis was placed on decision tasks. The main objective was to gain shared understanding of different rules, policies that people used to make a particular decision and how they would normally proceed to implement this decision.

Again, rather than creating the fine-grained models of different versions of decision-making tasks, shared understanding was achieved through collaborative exploration of different common and less common scenarios. As already stated in the previous sections of this paper, the KM field confirms that some aspects of tacit knowledge can be only externalized though collaborative problem solving. This was exactly the case with collaborative exploration of different scenarios that were proposed by the workshop facilitator as well as emerged during workshop.

This collaborative analysis (sub-phase) of the workshop focused on the key question that the workshop facilitator used to engage all workshop members: "How does this work in your world?" where "this" referred to different scenarios. This question would normally lead to discussion of different policies, underlying systems and even different aspects of organizational culture that have shaped the way a particular version of the process is currently implemented. Again, rather than focusing on process aspects (such as process structure) the main emphasis was placed on the knowledge, experience, and skills, participants currently bring to each task no matter how complex or simple it was. For example, the actual task of sending an order for goods and services to a chosen supplier is, in essence a very simple, routine task. However, it was acknowledged that the real value of this task was created by the team of purchasing officers who have established and continue to expand a network of trusted, high-quality suppliers and their extensive product knowledge. This product knowledge uniquely possessed by the individuals is an important factor considering the uniqueness of the materials/products purchased by them which may involve special occupational health and safety considerations as well as unique storage and handling procedures.

Looking from the KM perspective, the main objective of collaborative analysis was not on collaborative modeling but on building of shared understanding of current practices. KM processes included both knowledge acquisition from the key participants as well as knowledge transfer between different functional units via various KM techniques including discussion, clarification, and story telling related to different exceptions and management of complex cases.

The next phase, also performed during the workshops included knowledge co-creation that in essence, included collaborative design of new version of the key decision tasks as well as discussion of the associated policies (including both the existing and possible new policies). Compared to the typical BP improvement methodologies where the main emphasis is on design of a new "to-be" process, in this particular project the group focused on individual tasks first with the view that the overall process model will also emerge during the same process. The new knowledge was created through open discussion of new ideas and their possible implementation in different units. The key question used to facilitate this KM process was "How would this work in your world?" Even though participants decided not focus on the technology, they commented on possible support for different scenarios that could or could not be provided by the existing systems. The collaborative workshop resulted in a preliminary design of new decision tasks and the associated policies that were also combined in a new version of the e-procurement process. It is interesting to point out that, again the high-level model of to-be process remained the same. This is not surprising having in mind that this is the core BP that has to include a standard set of high-level tasks, because goods and services still need to be ordered and received and payments need to be made.

After the to-be processes are designed, typical BP improvement methodologies normally proceed with the implementation phase. In this particular project, the implementation phase again included a number of KM processes. After the workshop was completed and the agreed outcomes documented, this, now explicit knowledge was then communicated back to all organizational units for further analysis and discussion. The BPM team designed an implementation plan for new process after receiving feedback from all the units. In addition, they have mapped the existing data sources and developed an integrated view first at the conceptual level and then at the implementation (technical) level. This research thus brings up the importance of human knowledge and expertise in improving BPs.

4.3 Implications for practice

This study highlights the importance of the context and the knowledge of individual actors, which is often neglected or ignored in the BP improvement initiatives and methodologies. Most of the BP improvements involve knowledge-intensive collaborative processes that cannot be captured and prescribed by a process model. These findings have very important consequences for BPM practitioners, especially those in charge of BP improvement projects. Based on the results of this research, we argue that the practitioners should focus more on key knowledge processes rather than BP models that often obscure the role of individual and collective process knowledge. These processes should be carefully designed and facilitated to fully leverage the experiential knowledge of the key participants and contribute to the improvement. Rather than investing limited resources on the mapping and modeling of existing processes, practitioners will be able to better serve their organizations if they concentrate on the improvement of the process by tapping the process knowledge possessed by the individual actors and contextualized. By skillfully managing the process of knowledge transfer and conversion and by focusing on the decisions that govern the directions of a flow rather than the mechanics of the activities within the flow, practitioners can achieve process improvements. Streamlining the number and nature of the decisions that are required very often uncover several opportunities for significant process improvements in any process improvement project in general and in a knowledge-intensive processes in particular.

4.4 Implications for research

It is expected that this BP improvement methodology will be gradually extended to other faculties/departments. This would include a two-way transfer of knowledge from "completed" to "new" projects in order to continue to improve the underlying methodology and knowledge processes as well as from the newly completed projects to previous projects to ensure continuous improvement and sharing of new ideas. Our future research will investigate transfer and reuse of knowledge processes from one BP improvement project to another and the potential for its continuous improvement as it rolls out. We are particularly interested to find out the extent to which this particular team will be able to use the same knowledge processes and, in this way further confirm and define the emerging BP improvement methodology. Further, the extent and nature of the influence of individual and collective process knowledge of the actors in the BPs in the improvement of the BP itself in general and the expertise professional knowledge of these actors in particular needs further investigation. KM processes employed in this

BP improvement initiative include both knowledge acquisitions from the key participants as well as knowledge transfer between different functional units. It will be interesting to find out the relative influence of the knowledge of various actors, their position in the organization, their professional background/formation on the transfer and the process of improving the process.

5. Conclusions

The main conclusion of our empirical research is that BP improvement is, in fact, a complex, knowledge intensive, collaborative process. It consists of a set of coordinated, contextualized often emergent knowledge processes that cannot be captured and prescribed by a process model. Therefore, any process improvement methodology should focus on KM strategies and processes rather than place the main emphasis on BP models. The design of the "to-be" process in this study was a knowledge co-creation process that used collaborative exploration of different scenarios and contexts. Compared with the traditional BP improvement methodologies where the main emphasis is on the mapping of an "as-is" model and design of new "to-be" process model, the focus of the methodology employed in this case study is on the process of knowledge co-creation in the development of a "to-be" model in a consensus process simultaneously understanding and incorporating the existing constraints and decision points and leveraging the potential of technologies. This collective "know-how" is very important as it will genuinely lead to continuous and consensus process improvement. Thus, the BP model was not the main driver, but rather one of the expected outcomes. While processes lie at the heart of everything that organizations do to maintain and growth, the individual and collective process knowledge are the keys for achieving sustained process improvements.

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