Abstract

Business organizations operating in highly dynamic environments need agile processes. Though existing IT infrastructure including enterprise systems have made business processes cost efficient, they pose a serious challenge to process agility. This paper analyses their impact on the firm’s ability to build business process agility. Using a case study approach, this study observes that the effects, vary depending upon the type and extent of integration and standardization achieved, after the implementation of enterprise system. While technical tight-coupling of the enterprise system infrastructure may limit the firm’s ability to build agile processes, both vertical and horizontal integration, and standardization of the processes and information are contributing positively. The other two ES characteristics - best practices and process orientation, however, do not have any direct effect. Though it is difficult with existing IT/IS infrastructure, the potential ability of web services and SOA technologies to deliver both agility and control simultaneously appear promising.

2. Process agility - concepts

Business processes are central to the way organizations and individuals interact with one another [1] and are now considered the most valuable corporate asset [2]. In order to position themselves better to respond to market dynamics and changing business conditions, firms must be able to adapt quickly by changing and reconfiguring the necessary business processes nimbly [3, 4 & 5]. The need to improve customer service, to bring new products and services rapidly to market, and to reduce cost inefficiencies have been pushing business processes to the top of business organizations’ priority list [6, 7, 8].

Agility is a complex concept and analyzed across economics [9], operations and supply chain management [10, 4 & 11], strategic management [5] and information technology/information systems disciplines [12, 13]. Though different facets of agility are defined and emphasized throughout the literature, operationalization of process agility construct was only recently discussed in the literature [13, 14, 15 & 16].

Built from the literature on flexibility in Economics, the concept of ‘agility’ was further developed in agile manufacturing and now in strategic management and information systems literature. Flexibility refers to the capability of an organization to move from one task to another and adapt to expected changes [17, 18] and has dimensions such as product mix flexibility, volume flexibility, scheduling flexibility, routing flexibility, product flexibility, delivery flexibility [4, 19]. Agility
merges the four competitive dimensions cost, quality, dependability, and flexibility and moves beyond them with an ability to respond rapidly to any unexpected changes in market and business environment [17].

Though process performance objectives such as cost, quality and dependability are implicit in the term ‘agility’, the two concepts of flexibility and speed are particularly important and inherent to the definition of business process agility. In the past quality, cost efficiency and speeding up the business processes were sufficient to maintain competitive edge. Contrary to traditional view in which performance objectives such as cost, quality, dependability, flexibility and speed were considered at times conflicting, the new concept of ‘agility’ inherently postulates the possibility of simultaneously excelling in all the performance objectives with the help of existing and emerging information technologies/systems.

Some authors considered agility as a broader concept with two dimensions – ‘sense’ and ‘respond’ capability [20, 21]. Sambamurthy et al (2003) defined business agility as the capability of firms in managing their internal operations and interactions with their eco-systems and identified three types of agility – customer agility, partnership agility and operational agility [13]. While the first two deals with managing relationships with customers and partners, operational agility refers to the ability to rapidly redesign existing processes.

Modifying the definitions by Raschke & David, Sambamurthy, Meade and others, business process agility in this study, is defined as the ability to dynamically modify, reconfigure, deploy and control a business process (and its various components) to accommodate required and potential needs of the firm [16, 13 & 22].

The present day requirements of a cost-effective and responsive enterprise make it difficult for enterprises to stick to well-defined static business processes. It may be necessary for a firm to rapidly join or leave an inter-enterprise business process in a dynamic collaborative environment in order to respond to changes in markets, suppliers, customer requirements and different stakeholders.

3. Agility and Enterprise Systems

3.1. Role of IT and agility

Information technologies/systems today are considered a significant business platform for building and delivering this critical business need, ‘agility’ [15, 13]. While some researchers in the past argued that IT does not matter [23], other researchers have stated that it is not a matter of IT itself, but a matter of how IT is managed [24, 25 & 26]. As pointed by researchers, digitized platforms of business processes and knowledge, such as enterprise resource planning (ERP), customer relationship management (CRM), and supply chain management (SCM) allow firms to rapidly detect changes, flexibly alter their market strategies and react quickly to customers’ changing requirements, and help them form value-chain collaborations with partners for establishing niche markets. Thus, information technologies (IT) help build process agility not only for building new information-based products and services but also by streamlining processes and building inter-organisational relationships [27, 28].

Several information technology vendors and consultants have now made it their key strategy to help organizations to achieve agility. For example, IBM’s ‘on-demand’ vision, HPs ‘adaptive enterprise’ strategy, Oracle’s on-demand solutions, and SAP’s ‘agile enterprise’ strategy are all focusing on the ‘agility’ dimension and provide a variety of technical and organizational solutions to achieve a good level of business agility. Information Technologies (IT) such as enterprise system could have an enabling as well as a disabling role in building business process agility [15, 29].

IBM’s ‘on-demand’ vision promises information on demand through a combination of software, hardware, services and industry solutions and delivers agility, optimization of operations and customer service [30]. Its WebSphere integration software solutions are promised to deliver the requisite business process agility to business managers and help its business managers to respond to dynamic business conditions [31]. IBM’s information on-demand vision offers unified trusted view of information, and enables the organization to leverage the information better. With Service Oriented Architecture (SOA) as the foundation platform, Cognos and other IBM products will enable its customers to have agility to respond quickly to rapidly changing business needs [30].

HP’s adaptive enterprise strategy promises to help organizations to successfully position them and thrive in an environment of change. It aims to help organizations to move to an ideal state of agility, with the help of its products, services, solutions and technologies such as HP Partitioning Continuum [32] (HP 2008). By helping the organizations to successfully synchronize its business and IT infrastructure, its adaptive enterprise strategy is expected to help companies in achieving IT consolidation, business information optimization,
adaptive and flexible infrastructure, minimum total cost of ownership and capitalize on change [32] (HP 2008).

SAP, with its new Enterprise Service Oriented Architecture (ESOA) promises to provide the platform for increasing business agility through higher user productivity, greater reliability, reduced total cost of ownership and increased IT responsiveness [33]. Powered by SAP Netweaver technologies, SAP ERP solutions enable organizations to increase efficiency and growth by extending existing processes across new business boundaries, consolidating business and IT to leverage economies of scale, innovating existing business processes by developing composite applications and delivering flexible and highly productive user interfaces [34]. SAP’s ESOA developed upon open standards for exchanging information with a variety of systems such as ERP, HCM, SRM, CRM and SCM, and with a business process management platform, is expected to help its customers in improving agility and responsive to change [33, 34].

Information systems and technologies, themselves, however, may not be sufficient to achieve agility and non-IT attributes could also play an important role [35, 36]. Fink and Neumann pointed out the impact of IT personnel capabilities on IT dependent strategic agility through their effects on IT infrastructure capabilities including enterprise systems [35]. Deeper understanding of the role of information technologies and systems (IT/IS) and the capabilities of both the infrastructure and personnel in building agile business processes is useful in planning and allocating organizational IT resources. Recent advances in information technology/systems such as grid computing, web services, service-oriented architecture and business process management tools and solutions are centered on the goal of providing the requisite agility for enterprises [37, 38] and are expected to complement each other in making the processes more agile.

3.2. Enterprise systems context

Several IT-enabled innovations in general and enterprise systems in particular have contributed to the cost efficiencies through standardization, simplification, integration, and automation of business processes and their consistent execution [39]. Even though process reengineering at the time of implementing enterprise systems was advocated by software vendors, consultants, researchers and practitioners, many business organizations could not carry out improvements for several organizational, cultural and technology related reasons [40]. Continued usage of legacy systems, reluctance to change the configuration after embedding the system [41], the inherent nature of ES infrastructure that result in tight-coupling of structures, processes, business rules and roles and the associated interdependencies [42], and complex nests of links between various applications supported by a silo’s of technology from different vendors [15] have all been posing further challenges for firms in building agility.

Even though implementation of enterprise systems have made business processes cost efficient, they do not seem to have the ability to enable rapid changes to the business processes in response to changing business models and conditions [39, 12, 42, 14]. Like many IT innovations in the past, enterprise systems focused on increasing control and efficiency.

Though the original vision of enterprise systems was to create an environment of seamlessly integrated data, processes, technology and people, the reality is different. Many organizations still leave some legacy systems for a company specific application that needs integration with their enterprise system, choose a ‘best of breed’ approach in the selection and implementation of various application modules, use data warehousing technology to complement enterprise system’s in decision support capability, and need to integrate their enterprise systems with external processes and data [43]. Moreover, implementing the enterprise systems in phases (one module after another), upgrading them and then integrating with the changing hardware, networks and database software is a continuous process and thus may not help realize a truly “seamless” and “integrated” environment.

Enterprise system is a generic term, and its capability, scope, scale, technology orientation, functionality and architecture are continuously changing. In order to understand the impact of enterprise systems implementation on process agility, it is necessary to understand key characteristics embedded in an enterprise system. Based on literature review, several propositions with reference to each of the key characteristic are discussed below.

3.3. Integration

Integration is by far the most important characteristic of enterprise system discussed in the literature [43]. Enterprise systems are one of the key tools implemented by organizations to achieve ‘integration’ across the organization [44]. Though it is conceptualized differently by different disciplines depending upon their focus, organizational integration in business information systems literature
is generally defined as the coordination of various activities and processes carried out by different individuals, work groups, departments, and business units across various functions, across various business entities, across different hierarchical levels and strategy and culture [43, 45].

In information systems field, a technical perspective of integration represents the extent to which different systems are interconnected and can communicate with each other [46]. While in operations and supply chain management the concept of integration incorporates the coordinated management of information, material flows, processes through a common set of principles, strategies and performance metrics [11], in strategic management literature integration is defined as the process of achieving unity of effort among various organizational subsystems for accomplishing common organizational goals [47] and coordination of activities and the management of dependencies between them [48]. Integration in this study is thus defined as coordination of activities, processes and information across units and functions.

Integration in an organizational context can be viewed from three perspectives – vertical integration, horizontal integration and technical integration. Horizontal integration refers to interconnection between various departments or functions within an organization [49]. This cross-functional integration represents the extent to which different functions and business processes are interconnected and tightly coupled [50]. If it is between different hierarchical levels, it is termed as vertical integration.

While the horizontal integration is a critical determinant for facilitating cooperation and managing interdependencies across business functions [51], vertical integration facilitates enhanced visibility, accessibility, control and decision support capability [44], the key benefits of enterprise systems implementation. Horizontal integration achieved across the enterprise after the configurations and settings fully embedded, may discourage the firm from changing the processes because of the costly change management efforts and reluctance to disturb the well-set system. Vertical integration, however, may facilitate better understanding of the processes, information and decision making because of its ability to facilitate increased visibility and centralization of control. This may help top management to comprehend the critical need for process changes better and therefore position them well to build agility into processes. Many organizations may prefer to make further process changes during upgrades and thereby make their processes agile. Because of the demands they make on organizations during adoption and implementation, enterprise systems at best will provide a rigid platform for efficient management of information in the firm.

The technical integration facilitated by enterprise systems may result in tighter coupling with other practices and structures in the enterprise, and may create interdependencies. This may make it very difficult and costly for any organization to make any process change [42, 52]. The more an organization is integrated adopting integrated technologies embedded in the enterprise system software, the less flexible and more difficult to ‘disconnect’ [52]. If counterbalancing technologies such as middleware, point-to-point interfaces are not introduced, enterprise systems may actually reduce the agility [42].

By mapping the organizational structure and other elements into the system by way of configuration, the system is fit to the organizational needs. Once this configuration is completed, the system is tightly linked with organizational structures, processes, technology and people [51] and changing them is considered difficult and uneconomical.

This together with the insufficient levels of standardization and integration achieved because of the continuing usage of legacy systems, phased implementation of various application modules in an enterprise system and inadequate decision support capability of the system makes it harder to derive other benefits of integration. The benefits of integration thus are likely vary depending upon the nature and the extent of integration achieved [70, 53].

Therefore, technical integration and the resulting tight coupling of systems, structures and processes may restrict a firm’s ability to change and reconfigure business processes. Thus, while the level of horizontal integration achieved may have a negative influence on organizational ability to build agile processes, vertical integration may positively contribute to business process agility.

It is, however, important to note that it may not be necessary for some of the major standard processes supported by enterprise systems to be agile. For example, processes such as ‘procure to pay’, ‘order to cash’, ‘hire to retire’ etc. are not likely to change for some time and building agility into those standard processes may not be necessary. The integrated nature, higher visibility of information enabled by the enterprise system and the dependence on the internal tangible sources of information (ignoring the managerial judgment and external sources of information), however, could reduce the richness of information available to managerial decision making,
restricting the organization’s ability to respond with agility.

3.4. Standardization

Standardization is an agreed way of doing things. In the context of enterprise systems, standardization is the process of producing an agreement on technical and business specifications to be used consistently across the enterprise to ensure that processes, information, format and systems are interconnected and interoperable [44]. The very purpose of standardization of business processes is to rein-in the variability and variety of processes, terminology and definitions, information/data formats, and technology platforms/systems, spread across the organizational business units and achieve the efficiencies and consistency in execution [39].

Standardization of processes can facilitate efficient handoffs across process boundaries, better communications about how business operates and performance benchmarking [53]. Development of Supply Chain Operations Reference (SCOR), Design Chain Operations Reference (DCOR) models by the Supply Chain Council for high level processes in the supply chain and design chains; Capability Maturity Model by the Carnegie Mellon’s software Engineering Institute for software development processes; ISO 20000 for IT services Management standards, industry specific process standard models such as eTOM (telecommunication industry), and ISO 9000 quality management standards, or the higher-level industry neutral process classification framework developed by the American Productivity & Quality Council (APQC) are some of the global attempts at standardization of processes.

Recognizing the strengths and weaknesses in these different approaches and models, there are concerted moves to develop synergies from these process standardization methodologies and models in different industry sectors. For example, in supply chain context, it is believed that the complementary strengths and synergies developed by implementing TQM, Lean and Six Sigma along with SCOR models, will lead to a holistic process improvement approach that is customer focused, results oriented and contributes to effective execution of business strategy [54]. Similarly, it is possible to derive synergies and deliver consistent process improvements by applying TQM, CMM and ISO 9001 standards to the software development process [55]. Thus, standardization of processes and not just the CMMs or ISO20000 standards, will change how information systems are designed, bought and implemented [53].

By actively participating in these widespread initiatives to standardize processes within and across the enterprise and industry, ERP software vendors play an important role and make the process designs and improvements far more valuable.

Standardization of processes, information, technology platforms are typically carried out before implementing enterprise systems software. Inadequate levels of standardization may limit firm’s ability to access information and use if for decision making even if data is available somewhere in the system. In the absence of right and timely information, organizations may not be able to identify the appropriate process components and reconfigure the processes to deal with dynamic changes.

Therefore, higher the level of standardization achieved, higher the ability of the firm to build agility in their processes. The full benefits of standardization will, however be felt more if the organization is global and if the processes are repetitive and transaction-based processes such as ‘procure-to-pay’ and ‘order-to-cash’. If the processes are unique and specific to a particular location and are offering a competitive advantage, then enforcing an enterprise level standardised process, may actually limit the firm’s process agility. Of course, this may be challenging if the firm is trying to reconfigure inter-enterprise processes in a supply chain context.

On technology side also standardization is a feature. If the organization is a large global organization, consolidating the technology platforms (such as databases, networks, interfaces etc.) into standardised form, may allow easier integration among various process components, reduce maintenance costs, and allow the firm’s processes to be flexible. As it will reduce the need to develop interfaces between different applications and systems, a standardised technology platform may actually improve the potential process agility in a limited way.

On the other hand, technology may also restrict business process agility, as it can create tight-coupling of the infrastructure with processes, information systems, structures, work roles/people and technology becoming interdependent and tightly integrated with each other. Tight-coupling enabled by ES may make it difficult and/or prohibitively costly to change the processes quickly. Therefore, higher the standardization of the technology platforms, lower the potential for process agility.
3.5. Best practices

Best practice processes can be defined as the most efficient and effective way of accomplishing a process goal. These are methods and procedures proven over time for a large number of organizations. It is defined as a process of developing and following a standard way of doing things several organizations can use. If an ERP system has to generate desired benefits, business processes must be aligned with the business practices implicit in the ERP software [56].

Leading ERP software vendors such as SAP and Oracle routinely claim that the processes that are embedded in the software are typically of best practice. The software vendors also claim that the continuous updates of the software released as versions incorporate improvements in the processes, technology and other management issues. These large ERP software vendors reportedly investigated business processes across a wide variety of organizations and industries and then modeled the best of them into their software solutions [57, 58 & 59]. In fact, the term, ‘best practices’ is used as a marketing term and incorporated into various ERP products by large software vendors.

For example, SAP best practices ERP is a product trade mark and Oracle claims that the best practice processes are part of Oracle’s application integration architecture and their software solutions. This view is questioned by the recent research which argues that the organizational politics and other factors influence the creation of best practice software and the practices embedded in the software are in fact compromises rather than best practices [50]. In any case, software vendors’ best practices mostly relate to standard processes such as ‘procure to pay’, ‘order to cash’ and ‘hire to retire’ and do not cater to some non-standard and unique processes such as product development which are now considered vital for gaining competitive edge.

The software vendors argue that the ERP software can be pre-configured to deal with a pre-determined flexible process and transactional options through the use of complex tables, parameters and switches. Once these options are decided by the company using the solution manager or some other tool provided by the software vendor, it is extremely difficult and expensive to change these options in future. While tools such as solution managers may help in reducing the long implementation times and training costs, and thereby the total cost of ownership, the system remains inflexible after implementation.

Changing the processes after the implementation is beyond the scope of many enterprises, while the current environment requires their processes to be dynamic and change continually in response to those needs. Thus, there is an inherent conflict between the flexibility of the business operations and the rigidity imposed by the ERP system.

Even though some of the latest developments such as web services and service oriented architecture are expected to offer process components/building blocks and allow easy and flexible configuration, it is still in nascent stage of implementation.

Implementing these best practice processes and discarding the existing processes is expected to contribute to improved performance [26]. With these best practice processes embedded in the software, any variability in the process that is required for business reasons, may have to be handled as an exception expending considerable resources. Thus, while best practices offer some benefits in terms of efficiencies, they may not really contribute to agility. While periodic software upgrades may ensure continuous improvement of processes, the embedded best practices may have no influence on the ability of the firm to build agile processes.

Embracing the ‘best practice’ view advocated by the ERP vendors, may reduce the autonomy, eliminate competitive local practices and mandate higher order decisions. This may actually stifle ‘creativity’ and process innovation and may limit the potential of organizational business processes to be agile and dynamic.

3.6. Process orientation

Central to the notion of process, the term ‘process orientation or transversality’ is defined as a set of activities that transform inputs into outputs for customers [61] and refers to the process-oriented view of an ERP system. This definition emphasizes value adding activities, customer orientation and repetitiveness. Understanding their activities from a horizontal perspective would allow firms to get closer to their customers while simultaneously increasing the quality of their organization and their competitiveness [61].

Use of common language, customer focus, cooperation, holistic or big picture view, reduction of costs and delays, increasing learning, standardization and coordination are some of the manifestations of process-orientation [49]. In an ERP environment, it becomes necessary for everyone in the organization to understand not only the process in which they work, but also their own specific task, along with the impact their work have on other aspects of business.

Implementation of enterprise systems do not guarantee the cross functionality of the organization. It has to be built throughout the project’s life cycle...
The extent of the process-orientation accomplished may be restricted and dependent upon the implementation strategies and the extent of organizational integration and standardization achieved through ES implementation. This process orientation facilitated by enterprise systems may help employees adopting an increasingly broader enterprise perspective than a departmental one and facilitate the reduction of cross-functional conflicts. Though process orientation could be facilitated by the enterprise system, its ability to contribute to a firm’s ability to build agile processes is uncertain.

4. Research Methodology

4.1. Research objectives & methods

The objective of this research study is to analyse the influence of enterprise systems implementation on business process agility in an organizational context. Studying enterprise system as a system of processes may potentially reveal unanticipated synergies that can be created by exploiting interrelationships among its elements that exist in the new system, but did not exist in the old. Characteristics of enterprise systems that include integration, standardization, best practices and process orientation are used as a framework in this study.

Using these characteristics as framework, this exploratory study focuses on the influence of each of the key characteristics on the ability of the firm to build agility in their processes. With this in mind, the research was undertaken in order to develop understandings of the impact by a case study method. As Gummesson points out, the aim of case studies is not to establish a superficial cause-effect relationships and/or correlations, but to reach a fundamental understanding of structural and process [67]. Case study methodology can facilitate the development of understandings of the multiple interpretations of organisational life and can capture contextual richness and complexity.

Case study research thus offers deep insight into the impact of information systems on various organizational dimensions and attempts to understand the phenomena. Using semi-structured in-depth interviews of the key respondents that are actively involved in the adoption, implementation of the enterprise systems and post-implementation management of the company operations, primary data is collected. Given the nature of questions, in-depth interviews based on the perceptions, views and experience of the key individuals in the organization are considered more insightful. These interviews are recorded with prior permission and transcribed for further analysis. The data thus collected is coded and analyzed with reference to the characteristics discussed earlier.

Typical to case study research, this study had limitations including the lack of generalisability and subjective bias injected by the researcher as well as respondents. The extent of cooperation from different respondents in the organization was not uniform and the respondents may have either overrated or underrated the issues. These limitations, however, 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. The following section gives a brief background to the case study organization studied.

4.2 Case study organization

The case study organization is a continuous process manufacturing company that makes chemical products. This is a typical make to stock company that also fulfils some specific orders of major customers. Started about a decade ago, it currently employs about 400 persons. This organisation has SAP for the past ten years starting from the earlier versions and is now running on ECC 5.0. It has Sales and distribution (SD), materials management (MM), Financials (FI/CO), Plant Maintenance (PM), Asset management (AM) and Production planning (PP) modules. The company had carried about 20 modifications (customisation) to the software at the time of initial implementation in 1997. With every new upgrade in the past ten years, however, the company was able to do away with those software customizations gradually and now is close to a ‘vanilla’ implementation.

In addition to SAP, Lotus Notes, Novel networks systems, in business environment; it has a specialised manufacturing process control system and a laboratory information system. Interfaces with SAP were built for these applications. As mentioned in the literature review section, the scope of implementation would influence the effect of several ES characteristic such as integration and standardization and therefore their influence on the process agility. By implementing most of the application modules, the system is qualified as a good candidate for this investigation and therefore is selected for this study. This company therefore has the potential to offer a rich organizational context for this research. The
following section describes the research framework and presents analysis and findings.

5. Analysis & Findings

Integration, standardization, best practices and process orientation are the four key characteristics of enterprise system’s enabled environment. The following section evaluates their potential influence on agility and reports on the findings derived from the analysis.

5.1. Standardization and agility

Standardization and integration of the processes, information, business rules and technology platforms across the enterprise is expected to result in consistent execution of the processes and improved efficiencies. The benefits of such standardization and integration, however, depend on the scope and depth achieved in a typical enterprise system implementation. By implementing almost all the application modules that too with least amount of customization, this organization has standardized and integrated all the major processes and information across the major enterprise functions. As suggested by one respondent, simplification and standardization of repetitive processes such as procurement have helped this case study organization better and agility is not an issue there. In fact, as pointed out by another respondent, there is no need for these standard repetitive processes to be agile at all as they are not expected to change significantly.

In case of other non-standard processes, however, the firm has implemented its old processes that have grown out of the organization that does not exist now. In certain accounting processes and information, the organization has simply converted their old paper-based (inefficient) processes into an electronic system in ES environment. Assuming those old processes as standard has placed the organization into a tight corner with no discernable performance gains. This together with the organisational culture that has overemphasised on control in the past had made the processes so complex that it is too hard to contemplate any changes.

Therefore, standardization of repetitive processes that were efficient before ES implementation may have contributed to agility, but for other processes, standardising them and linking with technology in ES environment made those processes very rigid and inflexible. The company therefore, is now hoping to slowly change their processes by adopting the processes embedded in the ES version in every upgrade and thereby achieve efficiencies and agility. As pointed out by one respondent, standardization is good and leads to simplified processes. But, where ES is implemented without improving the process first, it has simply locked the inefficient business processes and restricted their agility.

5.2. Integration and agility

Given the size of the investment and its commercial off-the shelf nature, it is necessary for an enterprise system to be adaptable to organizational conditions and structures. Once the system is configured and embedded integrating the information and processes across the enterprise horizontally, the flexibility it offers may be limited and may depend upon the scope of ES implementation. With the implementation of most of the application modules, this organization has achieved full integration of its processes and information both horizontally and vertically.

As pointed out by one respondent, integration has enhanced their speed of execution and consistency of execution. In fact, the company’s slowest processes are the ones that don’t use integration of features of the enterprise system. From flexibility point of view, however, integration of processes has made them less flexible. Thus, while the speed has improved, the flexibility is compromised as a result of horizontal integration of processes in this firm.

Integration of information and processes vertically, however, has contributed to improved decision making in this firm. Improved managerial decision making, facilitated by the standardization and integration of the information as well as processes, have contributed to agility in this organization. As noted by one respondent, if all the processes and all of the data definitions are different, it is very difficult to make sense out of the reports produced by the system. In areas such as plant maintenance where there are lot of manual non-standardized processes and data, there is no potential for agility.

On the other hand, in procurement process where the information and processes are fully standardized and integrated, the process is very agile, especially because of the enhanced understanding and visibility of information and process both horizontally and vertically. The richness of the information that is available and accessible has not been affected and is not considered to be a limiting factor to agility. This study suggests that the benefits of integration are likely to vary depending upon the type and nature of integration and thus confirms the previous research
While horizontal integration has a mixed influence on the agility, vertical integration appears to have contributed to agility in this case study. While increasing the speed of process, the full horizontal integration facilitated by the enterprise systems has actually reduced the process flexibility. The technical integration in this organization is not complete, with a few legacy systems still supporting certain specific applications such as laboratory information system and plant maintenance operations. The organisation is planning implementation of SAP quality management module in future. Thus, the limited technical integration achieved by the enterprise system, though not restricting the agility, at present appear to have no effect on the firm’s ability to build agility in their processes.

5.3. Best practice processes and agility

Enterprise systems offer best practice processes. It is believed that the processes embedded in the software and implemented in this organization are truly the ‘best’ practices. As pointed out by one respondent, it is safe to simply adopt what enterprise system software suggests rather than changing/customizing its processes by changing the code. With continuous upgrades, these best practices are continuously improved and made available to the case study organization.

On an economic front also, this firm views this as a cost effective and efficient option. In any case, as observed by another senior manager, the core of the main business processes such as ‘procure-to-pay’, or ‘order-to-cash’ don’t often change in any enterprise system software. It is expected the software vendors will take into consideration the changes in technologies, education and skill levels of typical workforce as users learn about the software, and contribute to the evolving nature of business processes. Therefore, in this organization, there is a strong belief that the best practices are truly best practices and there is no need for them to be changed regularly.

Any improvement in the processes consequent to the evolution of technologies, skills and practices are generally incorporated in the upgrades and newer versions. In any case, taking the business processes outside the enterprise system’s environment, and changing them to deal with external demand is a very rarity in this organization, especially in case of standard transaction based processes supported by enterprise systems. Changing the business processes involves significant changes to the information technology systems, their interfaces, and organizational structures, and is generally discouraged in this organization because of the significant costs, change management efforts and particularly because it may encourage proliferation of non-standard processes, practices, technologies and systems in the enterprise. Thus, the best practices embedded in the enterprise systems do not have any specific influence on the firm’s ability to build agility in their business processes. It is expected that the best practices themselves will incorporate periodic changes necessary in the processes to deal with the dynamic business requirements (both internal and external).

5.4. Process orientation and agility

Imparting process orientation is not just the work of enterprise system. Even though, implementing an enterprise system has facilitated using a common language and cooperation among all users across the organization, there is no discernable improvement in customer focus and/or holistic view. As pointed out by one manager, process view is like a motherhood statement and everybody is happy to talk about it. But when it comes to do something or change their ways, or demonstrating it in practice and action, it is always challenging. While there is an evidence of some process-oriented way in the organization, especially at the higher management levels, it is very much influenced by the organizational culture and management policies and practices and individual capabilities and attitude.

Even though achieving process orientation is an ongoing process, its influence on process agility, however, is not significant. While there is some reduction of turf wars or conflicts between various functional managers, and a better appreciation of the inter-dependencies by managers across the enterprise, the impact of these developments on the ability of the firm to build agility into their processes is not clear. It is, however, believed that a better understanding of the processes by the senior management have made it relatively easy to change the process components and reconfigure them to deal with the external demands if necessary.

6. Conclusions

Agility of business processes is now considered important. It is expected to improve a company’s ability to exploit opportunities for innovation and competitive action. While enterprise systems in the past have contributed to simplification, standardization, integration and automation, their
influence on the firm’s ability to build agility is ambiguous and varies. In this organization, horizontal integration of processes and information has contributed to the improvement in process speed while compromising the flexibility. Vertical integration, however, has resulted in improved visibility, centralization and improved decision making, which indirectly contributes to process agility.

Standardization of repetitive processes that were efficient before ES implementation may have contributed to agility in this organization. But in case of other processes, standardizing them and linking with technology in an ES-enabled environment made those processes very rigid and inflexible. The ‘best practice processes embedded in the software are considered truly best practices in this organization. With regular updates ensuring the incorporation of latest developments in practices and technologies, it is generally believed that the requisite agility is also part of the best practices. This study results suggest the influence of integration and standardization characteristics on the firm’s ability to build agility in their processes. The effects, however, vary depending upon the type of integration and the extent of that integration achieved by the organization after the implementation of enterprise system. While the technical tight-coupling of the enterprise system infrastructure may limit the firm’s ability to build agile processes, both vertical and horizontal integration, and standardization of the processes and information appears to be contributing positively.

While demanding their IT infrastructures to be tightly integrated for control and visibility purposes with the help of enterprise systems, firms are seeking to deliver agility with loosely coupled systems and technologies simultaneously. Though it is considered difficult to achieve both agility and control simultaneously in the past, today introduction of web services and service oriented architecture are expected to deliver both. Recognizing the weaknesses of enterprise systems, ES software vendors and business organizations are expending a significant proportion of their IT investment in Web services and business process management technologies.

The leading enterprise systems software vendors such as SAP and Oracle are now incorporating Web services standards into their next generation software solutions. For example, SAP has so far delivered 1000 Web service components and recently released the first Web services enabled ES suite. These emergent technologies are centered on the goal of providing the requisite process agility to enterprises by offering a competent business process platform from which to dynamically compose processes [70, 37]. Building agility into business processes and implementing them is not easy and is dependent not just on the IT infrastructure including enterprise systems, but also on other factors such as business process management maturity levels and process characteristics specific to a particular organization. Further research on building and implementing agile processes in dynamic business environments is necessary.

7. References


