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Adoption of Software as a Service (SaaS) Enterprise Resource Planning (ERP) Systems in Small and Medium Sized Enterprises (SMEs)

Ravi Seethamraju

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Abstract Enterprise Resource Planning (ERP) systems are now offered on the cloud under the Software as a Service (SaaS) model. For small and medium sized enterprises (SMEs), this is considered the best opportunity to take advantage of the capabilities of an ERP system without the investment and management costs associated with the on-premise model. Using a cross-sectional field study conducted across four case study organizations, this study investigated the determinants and challenges in the adoption of SaaS ERP systems by SMEs. The study found that the determining factors in deciding to adopt SaaS ERP are software vendor's reputation in the market, software fit to the business, the potential willingness of the vendor to support the customer throughout the product life cycle, the vendor's participation in co-creation of value for customers and the generic benefits of implementing an integrated ERP system. With switching considered a costly option, accounting shift of capital costs to operating expenses is considered advantageous by firms. Competitive pressures faced by the enterprise, external factors, concerns about data security and system performance have no influence on adoption decision, according to this study. Change management and increasing the effectiveness of use are challenges, but the willingness of the software vendor to work with organizations' requests for changes and improvements and the continuous co-creation of value through improved product offerings is reassuring to the firms in the post-implementation phase.

Keywords SaaS · ERP · SMEs · Adoption

R. Seethamraju (✉)
Discipline of Accounting, The University of Sydney Business School, Sydney, NSW 2006, Australia
e-mail: ravi.seethamraju@sydney.edu.au

1 Introduction

Enterprise Resource Planning (ERP) systems are considered an important business innovation and their implementation is expected to benefit firms of all sizes. Considering a history of ERP implementation failures and high initial and ongoing costs, small and medium-sized enterprises (SMEs) are generally sceptical about ERP implementation and a business case for such a significant investment in time and money for on-premise models is difficult to justify. The Software as a Service (SaaS) model is fast becoming a cost effective way of delivering business applications (Haselmann and Vossen 2011) for all firms, especially SMEs. With potential benefits including reduced costs, ease of access to global innovations and scalability (Venkatachalam et al. 2012), SaaS ERP system offers an attractive option to SMEs to counter their problem of resource constraints and the complexity of business processes embedded in the traditional on-premise solution.

Although there is a lot of interest among practitioners on SaaS ERP systems, empirical research on the adoption and use of SaaS ERP systems is limited (Salleh et al. 2012; Venkatachalam et al. 2012; Johansson and Ruivo 2013). Recent call for papers for SaaS related studies (e.g. cloud computing and service science) in peer-reviewed IS journals, along with specific suggestions from researchers (Candan et al. 2009; Venkatachalam et al. 2012; Lewandowski et al. 2013) show that SaaS is slowly gaining traction among researchers. While deployment of IT innovations is expected to enhance firm performance (Hempell and Zwick 2008), studies in the context of SMEs on the adoption and post-adoption impacts of ERP systems are limited (Engelstatter 2012) and of SaaS ERP systems are rare (Lewandowski et al. 2013; Yang and Tate 2012).

According to Gartner, worldwide IT spending is forecast to reach $4.2 trillion by 2017 and the enterprise application software market is expected to reach $320 billion in 2014

(Gartner 2014). While relatively small in proportion to the overall enterprise application software market, SaaS is projected to reach a market volume of $21 billion in 2015 (Gartner 2012). ERP in SaaS deployments is less prevalent compared to other SaaS deployments, but is gaining momentum (Aberdeen 2012). The expected growth rate in two of the fastest developing economies—India and China—is 11 % (Gartner 2012). These SaaS based models are predicted to be used not only for non-critical and operational level applications but also for strategic core business functions (Zainuddin and Gonzalez 2011).

These statistics imply that the SaaS market is expanding and that SaaS will have more significant impact on individual organizations—both large and small—and that therefore research into the determinants and challenges of SaaS based models is necessary. With multi-tenancy environment, minimum options for customizations and service delivery features, SaaS ERP models are significantly different from on-premise models and therefore the determinants for their adoption and challenges in post-adoption environment are different.

This research study aims to fill this gap and analyses the determinants and challenges in the adoption of SaaS ERP systems in SMEs. It will first briefly review the literature on SaaS models in general and SaaS ERP systems in particular. It will then explain a cross-sectional field study methodology employed in this study including details about the case study organizations, respondents and data collection process. The analysis, discussion and findings are presented before the paper concludes with implications, limitations and suggestions for future research.

2 Literature review

2.1 SaaS, ERPs and SMEs

SaaS, also termed'software on demand', is increasingly a popular tool for implementing various business applications. Although on-demand software application delivery models have been in existence since the 1990s, and offered in many forms including application service provision (ASP) or business service provision (BSP), the SaaS model of software delivery is fast becoming a serious option for enterprises of all sizes and types (Haselmann and Vossen 2011). The Application Service Provider (ASP) model, popular in the late 1990s, hosts a commercial software application in its secure centrally located servers and licenses the application to multiple customers. With no control over the features and development of commercial applications and no domain knowledge to effectively customize and support the applications to individual customer needs, the cost and innovation benefits of the ASP model were very limited (Benlian et al. 2009). Compared to the ASP model, the SaaS model has a shorter implementation time, higher intuitive usability, multi-tenant scalability (Ju et al. 2010), easy to use web-based programs, and with regular enhancements and upgrades, is considered cost effective (Low et al. 2011).

The SaaS model is defined as *an application or service that is deployed from a centralised data centre across a network, providing access and use on a recurring fee basis, where users normally rent the applications/services from a central provider*" (Hoch et al. 2001). In this model, a provider delivers an application based on a single set of common code and data definitions, which are consumed in a one-to-many model by all contracted consumers anytime. They use the service on a pay-for-use basis or on a subscription basis (Clark 2006; Xin and Levina 2008) as per the conditions negotiated in the contract and receive in return the service promised in the service level agreement.

Relative to the on-premise models, the SaaS environment delivers more freedom to the customer to change provider or exit if the solution and/or service are not satisfactory. In order to continue service provision and business, SaaS vendors are required to innovate and improve continuously the product and service delivery through efficient backups, software updates, contingency plans, disaster recovery plans and security updates (Corsello 2009) when compared to on-premise models. With active feedback from, and participation of, customers the SaaS model of service delivery could become another IT based instrument that helps to co-create business value (Kohli and Grover 2008). Compared to the 'on-premise' model, SaaS based solutions have shifted the value frontier and may provide the same level of value at a lower price, or more value at the same price (Lenart 2011). Total cost of ownership, speed and ease of deployment, reliability, data security, data safety and disaster recovery, and risk mitigation through insulation from continuous technology upgrades are cited as some of the key benefits of the SaaS model (Waters 2005).

The literature cites several potential benefits for SMEs. Some of these include reduction of software licence, hardware, IT personnel and maintenance costs, lower total cost of ownership, transforming capital expenses to operating expenses, easier upgrading and implementation, increased scalability, greater utilization of resources, increased ability to focus on core business, flexibility for business innovation and improved communication with external partners (Salleh et al. 2012; Hofmann 2010; McCrea 2011; Saeed et al. 2012).

2.2 Adoption of SaaS ERP systems in SMEs

This section presents a discussion of the influence of environmental, technological and organizational factors in adoption decisions.

2.2.1 Environmental (external) factors

Environmental factors are recognised as amongst the factors influencing the adoption of IT solutions in the literature. For example, the relative advantage of adopting a new technology when compared with competitors (Low et al. 2011), pressure from large customers and/or trading partners (Pan and Jang 2008; Chan and Ngai 2007), pressure from suppliers (Caldeira and Ward 2002), and legislative pressure and regulatory requirements (Melville and Ramirez 2008; Koumbati et al. 2006) were considered determinants in the adoption of any new IT innovations. Further, capabilities and the reputation of the SaaS vendor (Heart 2009) have a positive effect on the adoption intentions of users. Although software vendors consider novelty and lock-in as important factors, they are no longer relevant. Amongst the clients signing up for a single SaaS ERP system, the relative competitive advantage may not be a significant factor as the application offered to all the clients is exactly the same in a multi-tenant context. But when comparing adopters and non-adopters, the relative advantage of implementing an IT solution such as an ERP system may be a significant factor (Hunton et al. 2003). With limited resources and capabilities to customize and build solutions, the SaaS ERP model provides SMEs opportunities for the exploration and exploitation of external resources and competencies that are not generally available to them and to cope better with external pressures.

2.2.2 Generic benefits of ERP systems to SMEs

ERP systems are standardized off-the-shelf packages that, if implemented in SMEs, can deliver benefits such as efficient business processes, real-time access, visibility and accuracy of information, and effective information management (Seethamraju and Seethamraju 2008). Until recently the cost of adoption and management of an ERP system on-premise was high and required significant resource commitments that many SMEs cannot afford. On-premise ERP systems involve significant investment in hardware infrastructure and software licensing, and their implementation requires costly, time-consuming and risky extensive business process changes (Mijac et al. 2013). Typical customers of ERP systems have therefore been larger and more profitable well-established enterprises. In order to cater to the needs of SMEs, ERP vendors such as SAP and Oracle have been offering scaled down and less expensive on-premise solutions and now SaaS based models. With dramatic changes in the technologies and competition forcing many SMEs to adopt better technologies, they are now adopting ERP systems for benefits such as standardization, integrated best practice processes, information visibility and real-time data. The next section explains the factors influencing the adoption of SaaS ERP systems in SMEs.

2.2.3 IT readiness of the firm

IT capability constraint is a factor in any IT adoption decision and subsequent use, and especially so for SMEs. In general, leveraging the benefits of IT/IS investments is challenging for SMEs given their limited technical and human resource capabilities (Ada 2009). With the responsibility for IT infrastructure and maintenance taken over by the service provider, adopting a SaaS ERP system may decrease the need for technical IT capabilities and resources (DeSisto 2009). Moreover, if adopting a SaaS model of service delivery can reduce hardware and resources required for back-ups, database administration and system infrastructure upgrades, adoption and management may become less expensive (Saini et al. 2011). Having less legacy IT infrastructure may also be an advantage for SMEs. It would make it easy for SMEs to try a new application such as ERP or a new functionality in the cloud. Reduced overall costs, ease of access to global innovations and scalability delivered by the SaaS software vendor could make a SaaS ERP model a better option for SMEs to overcome their IT capability constraints. By adopting a SaaS ERP model, SMEs can move large parts of their business IT to the cloud and achieve efficient, flexible and scalable processing power (Karabek et al. 2011). Even though a SaaS ERP model reduces the need for IT department staff and other resources, it still requires some resources to access the systems and for application configuration.

However, a study by Low et al. (2011) observed the adoption decision was not influenced by a firm's technology readiness and IT capabilites. Therefore, the resources constraint that is typical to SMEs (Ada 2009; Haselmann and Vossen 2011; Kugel 2007) is not a factor in their adoption decision. For SMEs without the capabilities and resources to set up the initial IT infrastructure, SaaS providers generally offer prices and SLAs (service level agreements) that are far cheaper than what SMEs themselves can realise with their limited investment levels. Thus, IT infrastructure and the readiness of the firm do not appear to be significant factors influencing the adoption decision.

2.2.4 Total cost of ownership

SaaS ERP implementations required no upfront investment, which allows cash strapped SMEs more flexibility. Because the SaaS ERP model offers most of the IT costs as variable operating costs rather than initial capital investment, SMEs should be more willing to adopt these systems, and can help SMEs to manage their capital flows better and reduce their risk. However, SaaS can also be costly in the long-run as per-use costs for the provision of software continue for the life of the SaaS system. According to a Gartner's survey of the users and prospects of SaaS solutions in 2009, 90 % of the SaaS offerings are not 'pay per use' and the total cost of ownership

is not guaranteed to be less than on-premise alternatives (DeSisto 2009) with lock-ins and contracts a common feature.

TheSaaS ERP system is considered more suitable for SMEs than large enterprises primarily because of the low total cost of ownership (Lenart 2011; Karabek et al. 2011). In addition, faster implementation times and benefits realization, the absence of expensive consultants, more predictable IT expenditure, outsourced expertise and easier and cheaper upgrades and maintenance may contribute to the lower total cost of owning an ERP system (Johansson and Ruivo 2013; Benlian and Hess 2011). Faster implementation could also save indirect costs of implementation and change management in SMEs (Benlian et al. 2009). With low total cost of ownership, the SaaS ERP model provides SMEs a chance to access advanced business application software.

2.2.5 Change management and managerial assumptions

Previous investments, entrenched management assumptions and traditional practices are considered to be the biggest impediments to organizations moving to SaaS based models (Carr 2005). In an SaaS ERP model, SMEs do not get a sense of ownership as they neither own the infrastructure nor run the applications. Even if there is a rapid deployment of a particular functionality or application because of the SaaS model, there is no guarantee that the users would accept and use that feature or functionality effectively. On the positive side, it is relatively easy to discard old processes and practices and adopt new software-eanbled processes in SMEs. Given their faster decision making, cost imperatives and flexibility, it may be relatively easy to deal with change management and implementation issues in SMEs.

Given their limited resources, SMEs typically lack strong information technology diffusion processes and tend to share information within the organization and with external stakeholders through informal direct communications such as email, telephone and meetings (Welker et al. 2008). Without an enterprise system, SMEs typically rely on spreadsheets and other stand-alone tools and systems to support business processes and monitor performance (Kugel 2007). Consequently, SMEs may have less accurate reporting processes and opaque financial operations and performance. These informal processes be a positive factor in a successful ERP adoption (Deep et al. 2008). Larger enterprises, that have more established processes, systems and roles may be reluctant to change and may actually seek an ERP system that is flexible and easy to customize to suit their internal processes and business needs. Therefore, an SME with the capability to support a vanilla implementation of an ERP system by discarding its existing processes and systems and by fostering a culture of change and education will be in a better position to effectively support adoption.

2.2.6 Security and other concerns

A potential concern for SMEs is that the data and system is completely stored and managed by the SaaS ERP software vendor or service provider, possibly raising issues of security and privacy of the data, and performance and reliability of the system. Despite data being located outside their firewall and the systems that process information and produce financial statements not being owned by them, SMEs are responsible for the controls and regulatory compliance. Managing this risk is a challenge for many SMEs. In several surveys of IT executives and practitioners in Europe and US security and technology related reasons were given for the reluctance to move to SaaS models. They include security of the system, confidentiality and privacy of customer data, system reliability, performance instability, absence of god service level agreements, latency and network limits, integrity of the provider, absence of alternative arrangements during service disruptions, inability of the vendor to manage network security, poor interconnectivity and interfacing with other existing applications, and no scalable storage (Aberdeen Group 2012; Gartner 2012; Benlian and Hess 2011; Benlian et al. 2009; Johansson and Ruivo 2013; Sultan 2011; ENISA 2009; Salleh et al. 2012; McCrea 2011; Hofmann 2010; Lenart 2011; Karabek et al. 2011; Weil 2007; Welker et al. 2008). Locking-in with the service provider, losing control of IT infrastructure, issues of interoperability and portability may also limit SMEs' options to adopt new and additional functionalities and capabilities from other software vendors (Hofmann 2010).

The promise of support and service to SMEs on a continuing basis is an important factor in the cloud computing context. A recent study by Johansson and Ruivo (2013) highlighted the importance of customer support in the SaaS ERP context. They argue that the kind of support given to customers and the customer experience is far more important than the product itself. In the SaaS ERP systems context, the paradigm appears to be changing from product features to service trust (Johansson and Ruivo 2013). But given the importance of ERP systems in supporting mission critical and core applications in SMEs they may be reluctant to hand control over to a third party service provider if introduced during ERP software an implementation (Johansson and Ruivo 2013). Although a standardized interface, better protection in terms of filtering and patch management, deployment of standard information systems policies and rapidity of response to security attacks are some of the benefits SaaS ERP systems can offer to SMEs (Marston et al. 2011), security risks may increase in the early stages of SaaS offerings (Marston et al. 2011). For example, it may be difficult for the user organization to check effectively the data handling practices of the provider. Multiple tenancy and reuse of hardware resources in a SaaS ERP environment may make it difficult to

carry out adequate, safe and timely deletion of data and therefore may introduce an additional risk in terms of security and legal compliance for sensitive data.

Limited empirical surveys of customer satisfaction in Europe on the general adoption of cloud services reported mixed results. For example, 33 % of the respondents in a Gartner survey expressed dissatisfaction with their SaaS based solutions and stated that they did not meet their basic technical requirements. Contrary to this study, SaaS customer satisfaction was found to be strong in requirements such as solution functionality, response time, availability and pricing (McNee 2008). Citing 90 % renewal rates as as an endorsement of SaaS based solutions in Europe and the UK, Kaplan (2009) reported high levels of satisfaction. Thus, security and technology-related factors such as data security, privacy of data, system reliability, lock-ins, scalability, fear of service disruptions, ongoing service support, difficulties of integrating with other existing applications, poor Internet bandwidth in certain areas and inadequate supporting IT infrastructure are key factors that could limit the adoption and use of cloud services in general, and SaaS ERP systems in particular, amongst SMEs.

2.2.7 Configurability and customizability of SaaS ERP solution

The SaaS ERP system is a single-code multi-tenant packaged solution available to several clients and requires configuration of the software for each client. Configuration helps the customers to adapt the software to fit their individual requirements (Nitu 2009). It involves incorporating unique organizational structure, legal framework, reporting, formatting and processes. SaaS ERP vendors offer configurability either by allowing clients to configure the software themselves or by configuring the software on their behalf (Zainuddin and Gonzalez 2011). This configuration, carried out either by the vendor or a third party service provider, is straightforward and does not affect the software. The modular and flexible natures of SaaS ERP systems make them easily configurable to suit SMEs' needs. In fact, the more mature a SaaS offering, the better its configurability options (Hudli et al. 2009).

Customization involves creating something new and/or adding a feature to the standard functionality of the software, available to all clients. If this is unique to a particular firm, rather than generic, then the firm must decide whether to customize the software on their interface for a premium price or to simply use the existing features. As SaaS models are in a multi-tenant environment, it is difficult to offer different predefined configurations and ad-hoc customizations and separate them for different tenants. SaaS ERP systems therefore, offer less flexibility and minimum customization options when compared to traditional on-premise solutions. Unlike the ASP model, SaaS models, with their multi-tenant architecture, allow for customer side customization interfaces that overcome the deficiencies arising from provider side customization (Xin and Levina 2008). Although common amongst on-premise ERP systems, customization undermines best practices embedded in the software, increases complexity and makes it costly to maintain and integrate with other applications (Nitu 2009; Weil 2007). About 70 to 80 % of the on-premise ERP implementations by large ERP vendors such as SAP, Oracle and Microsoft are customized, which then, in fact, becomes symptomatic of bigger problems – solution mismatch and inadequacy of the ERP system (Mijac et al. 2013). Thus, while customization and the associated flexibility may increase adoption rates (McCrea 2011; Lenart 2011), the associated significant costs and complexity may become a barrier to adoption (Saeed et al. 2012; Low et al. 2011). Rather, as Schubert and Adisa (2011) argue, SaaS models may be more suitable for those firms that do not require much customization or integration with other applications.

SMEs, therefore, have to carefully evaluate the 'fit' between their own processes and the processes embedded in the software and make a decision to adopt. For successful adoption, SMES must decide either to follow the processes embedded in the software (discarding the existing processes and reports) and/or to develop some 'work-arounds' bypassing the SaaS ERP system to meet specific business needs (Welker et al. 2008). Thus, ease of software configuration and 'good fit' between the SaaS ERP solution and firm play an important role in the adoption decision as well as in its impact.

2.2.8 Impacts - potential process improvement, innovation and decision making

Adoption of SaaS ERP systems could potentially contribute to improvements in decision making, process improvement, innovation and firm performance. ERP systems may enable improved visibility of information and processes in the product life cycle and resource usage in real time, and therefore may make it easier for SMEs to identify continuously opportunities for product enhancements and process improvements (Dehning et al. 2007). Implementing an ERP system is likely to contribute to automation and improvement of low level transactions and processes, leaving more time and resources for SMEs to focus on complex and critical activities, such as product development and customer relationship management. A centralised network position enables business units to access new knowledge generated by other units faster and therefore could help them become more innovative. Improved contacts and communications with suppliers and customer enabled by an ERP system, may help SMEs generate more innovations, considering the importance of backward and horizontal knowledge linkages for process innovation (Roper et al. 2006). The ERP system, through a centralised enterprise wide database, delivers necessary data in real-time

and enables employees to be more innovative and flexible (Davenport et al. 2004). SaaS based solutions have the potential to make employees discover novel and innovative ways of using the technology, facilitate better collaboration amongst employees and make employees more productive (McAfee 2011). They help them to observe, control and compare the results of process innovations and consistent execution and offer greater insights into further improvements in organizational structure, responsibilities and decision making processes.

Further, integration of information systems, data and processes facilitates enhanced information processing capability and thereby the reliability and speed of decisions (Holsapple and Sena 2005). Managerial usage of IT, according to an empirical study by Maiga et al. (2013) affects quality and cost improvements and thereby firm performance. Even in the post-implementation period, changes to ERP systems by way of enhancements, upgrades, abandonments and switches help firms in their effective use and resolve some implementation issues (Nicolaou and Bhattacharya 2006). In a SaaS ERP multi-tenant environment, most of the enhancements, patches, switches and upgrades are automatically delivered to clients. Continuous interaction with clients enables the software vendor to discover some of the issues that may surface during the implementation and incorporate them as standard features/functionality to all clients.

SMEs need to be innovative, flexible and efficient and ideally IT innovation should contribute to that goal. SMEs in general, could potentially be more innovative because of their inherent flexibility, faster decision making and willingness to try new approaches and technologies (Karabek et al. 2011). In general, deployment of IT is expected to enhance firm's process innovation performance (Brynjolfsson and Saunders 2010). Though empirical evidence is not yet available, the potential for process improvements and co-creation of value is considered significant in a SaaS environment, where vendor and user can work together and improve the product offering as well as business processes (Sarker et al. 2012).

3 Research questions and methodology

3.1 Research questions

The SaaS ERP solution is a relatively new phenomenon and little is known about the drivers, inhibitors and organizational factors influencing decisions to adopt and manage. Understanding the drivers for the adoption of these SaaS based ERP systems in SMEs, challenges in their implementation and their impact will help organizations achieve better return on their significant IT investments. Therefore, key research questions this study aimed to investigate are:

i. Why do SMEs adopt SaaS ERP systems?
ii. What are the determinants and challenges?

With more than $25 billion dollars investment in ERP systems so far, and a clear shift towards SaaS models (Gartner 2012), the need for achieving good return on these IT investments is never more important. This study, by investigating the factors influencing the adoption of SaaS ERP system and their implications, will offer new insights and provide much needed empirical evidence. The findings of this study contribute to the limited knowledge in the field and add to the IT adoption literature. The insights from the study will provide practitioners with guidance for exploiting the full potential of these emerging IT innovations and improve returns.

3.2 Theoretical framework

While implementation of IT innovations plays a complementary role in generating sustained competitive advantage, the reasons for adoption and the nature of their impact on organizational performance varies from one organization to another. This is contingent upon varying contexts within which these implementations are situated including external competitive factors, internal organisational factors such as firm size, internal processes, degree of fit, changes these systems enable, the extent and nature of use of these systems after implementation and, of course, the technology innovation itself. There are several theories that deal with the adoption of IT innovation and the most used theories are the technology acceptance model (TAM) (Davis et al. 1989), theory of planned behaviour (TPB) (Ajzen 1991), unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al. 2003), diffusion of innovation (DOI) (Rogers 1995) and the TOE framework (Tornatzky and Fleischer 1990). The TAM, TPB and UTAUT are at the individual level while the DOI and TOE frameworks are at the firm level (Oliveira and Martins 2011). The firm level contexts include organizational, technological and environmental related factors and are consistent with Roger's (1995) theoretical analysis. Therefore, the Technology-Organization-Environment (TOE) framework developed by Tornatzky and Fleischer (1990) is considered appropriate to analyse the adoption of SaaS ERP systems in this study.

The TOE framework is one of the most popular and useful frameworks for information technology/systems implementation research (Zhu et al. 2004). This framework presents constraints as well as opportunities for technological innovation (Tornatzky and Fleischer 1990, p.154) and integrates contingent organizational and environmental factors faced by firms (Kuan and Chau 2001). It identifies three aspects of enterprise context—technological, organizational and environmental and provides a unified perspective from which a firm's internal and external factors, as well as technological factors, can be examined. Previous studies using this framework have incorporated the technologies available to the firm

both internally and externally, organizational factors such as firm size, scope, internal resources, culture and managerial structure, and environmental factors that include competition, heterogeneity, government regulation and environmental uncertainty (Li et al. 2010; Pan and Jang 2008). Although specific factors identified within these three contexts may vary across different studies, the TOE framework has consistent empirical support as applied to various IT innovation domains (Oliveira and Martins 2011).

3.3 Research methodology

Given the nature of the research questions and the nascent stage of the research on the topic, a cross-sectional field study using multiple case study organizations is considered appropriate for this research. A cross-sectional field study involves limited-depth studies conducted at a non-random selection of field sites and lies between in-depth case studies and broad-based surveys. These studies are less structured in their data collection than surveys, and involve shorter, less intensive data collection on site than in-depth case studies (Lillis and Mundy 2005). Thus, employing a cross-sectional field study approach deals with more complex "how" and "why" questions better than survey approaches (Eisenhardt 1991; Ahrens and Dent 1998). Within a confined domain, a cross-sectional field study provides researchers with an effective means of capturing complex phenomenon and helps uncover ambiguities and conflicting results.

Individual perceptions of senior managers are used to understand, connect and substantiate organizational level phenomenon (Lillis and Mundy 2005). The aim here is not to establish a superficial cause-effect relationship and/or correlation, but to reach a fundamental understanding of the phenomenon under investigation. Such cross-sectional field studies using multiple case study organizations provide an opportunity to explore new areas (Klein and Myers 1999) such as adoption of SaaS ERP systems and facilitate understanding of the multiple interpretations of SaaS ERP adoption from different perspectives (Yin 2009). Since the adoption of a SaaS ERP system takes considerable time and typically involves multiple actors from within and outside the organization, data was collected from senior managers of the enterprises and implementation consultants and representatives of the software vendor who were involved in the implementation of SaaS ERP at those firms.

Employing TOE framework as a basis for data collection and analysis, this study proposes a conceptual model for further testing and theory development. Using an approach suggested by Eisenhardt and Graebner (2007), a theoretical framework is explained first, followed by an implicit statement of propositions with supporting empirical evidence for each construct in the analysis section. Finally a conceptual model and propositions are presented for further testing.

3.4 Case study organizations and respondents

Data was gathered from four case study organizations that use a particular SaaS ERP system provided by one international vendor, RAMCO. Focusing on organizations that use similar SaaS ERP system provided by one international vendor controls for the variation in the features and functionality provided across vendors. RAMCO is one of the leading SaaS ERP software vendors in the world with headquarters in India. It is a number one enterprise solutions company in India and Asia with more than US$1 billion sales with 19 offices worldwide and employs about 1,700 people (RAMCO 2014). According to its website and published information, it has more than 150,000 users in more than 1,000 customer organizations spread across the world in India, Europe, USA, Asia, Middle East and Africa and operates in several industry verticals including—Aviation, Energy and Utilities, Equipment Rentals and Services, Government, Infrastructure, Logistics, Manufacturing, Mining, Professional Services, and Trading. RAMCO has delivered solutions to complex business problems across diverse industries through a comprehensive portfolio of products and services such as RAMCO Aviation on Cloud, ERP on Cloud, HCM on Cloud, Analytics, and Government (RAMCO 2014). To support these products, RAMCO offers a portfolio of services including consulting, managed services, implementation services, customer development, support services and training (RAMCO 2014). This company has large, small and medium sized enterprises as its customers across the globe.

The definition of SME varies from country to country and in some countries, industry to industry and is based on number of employees, investment in plant and machinery and/or annual turnover. From a list of RAMCO customers across the world, firms with SaaS ERP system (RODE—RAMCO on Demand ERP) for at least 3 years in operations and firms with 300 employees were identified as suitable for this study. This is to ensure that the selected firms had some experience of using the system and are comparable in terms of size. The four firms selected were willing to participate in the research process during the researcher's visit.

From each of the four firms, multiple respondents were selected for interviews and include senior executives and operational/functional managers, which encompass CEOs, CFOs, senior managers in Finance, Accounts, operations and IT (see Table 1). All the companies studied were engaged in manufacturing. Table 1 gives a summary of the characteristics of the organizations and respondents that took part in this study.

3.5 Data collection

Given the exploratory nature of the research, interviews based on individual perceptions and perspectives of the key

Table 1 Summary of organizations and respondents

Background to the organizations studied	Details of the respondents participated in the study
Steelco - A medium-sized steel products manufacturing company with around 350 employees in India; implemented SaaS ERP that is in operation for the past 4 years; modules include supply chain management, purchasing, inventory, accounts/finance and human resources	• One Chief executive Officer/Director (R1) • One Chief Accountant—involved in the implementation of SaaS ERP (R2) • General manager—responsible for the operations and SaaS ERP implementation (R3) • One manager—responsible for operations (R4) • Implementation consultant from software vendor (R5)
Powerco - A power infrastructure and project management company with about 350 employees in India; implemented SaaS ERP that is in operation for 4 years; modules include accounts/finance, inventory management, supply chain management and purchasing.	• One Chief executive officer (R6) • Purchasing manager—member of the SaaS ERP implementation team (R7) • One CFO/CAO with experience of working in ERP implementation in the past (R8) • Implementation consultant from software vendor (R9)
Enerco - an energy company that manufactures and installs small scale power plants at various locations in India; employs about 300 people; has SaaS ERP for 4 years; implemented all the modules including inventory management, supply chain management, accounts/finance and human resources	• General manager (R10) • Chief Accounts Officer—active role in the adoption and implementation decision (R11) • Implementation consultant from software vendor (R12)
Autoco - A medium-sized manufacturing company, manufactures/processes automobile components for its parent company and others; 250 employees in India; implemented all the major modules; has SaaS ERP in operation for 3.5 years.	• General manager—operations (R13) • Implementation consultant from software vendor (R14)
SaaS ERP vendor—a large SaaS ERP vendor with international presence and headquartered in India; have more than 300 installations	• Implementation support specialist (R15) • Pre-sales consultant (R16) • Head—implementation (R17)

individuals in the organizations were undertaken, with primary data collected from two to four key respondents in each of the organizations actively involved in the adoption decision of SaaS ERP systems during 2012–2013. Accordingly, 14 respondents from four different case study organizations in India were interviewed along with three senior managers in the software vendor company to understand the supplier perspective. Each respondent was interviewed for about 60 to 90 min duration. These research interviews were recorded with prior permission and transcribed for further analysis. A protocol was prepared for the collection of data and two pilot interviews were first conducted in order to test the process of questioning and its structure (Yin 2009). The use of semi-structured interview protocol and recording the data mechanically using a digital recorder, were steps employed to improve reliability.

Data validation took place in three ways. Firstly, interviews were recorded using a digital recorder and verbatim transcripts were prepared. Secondly, these transcripts were sent to individual respondents for validation and their corrections were incorporated. Thirdly, a chain of evidence was established using verbatim transcripts and notes of observations made during the interview. The texts of these interviews were quite extensive and ran into more than 100 single-spaced pages. In view of the volume of the text, some examples of managerial quotes have been paraphrased and included in the analysis and discussion section in italicized form. The data thus collected was coded and analyzed with reference to the themes identified earlier in the literature review and theoretical framework and are presented in the analysis section. In the data analysis stage, two study participants from the case study organization and software vendor, and an objective researcher and a colleague not involved in the data collection reviewed the data analysis, initial observations and summary of the findings. These findings were compared with relevant extant literature. Thus the data was validated and its reliability improved at the data collection, analysis and interpretation stages.

Interview questions were loosely structured allowing flexibility in responding. Starting with the background of the respondents to understand the context and their perspective, two main questions were asked. The first question was intended to elicit respondents' perception of the key factors influencing the firm's decision to adopt the SaaS ERP system. Respondents were also asked about their views on the determinants in the firm's adoption of the SaaS ERP solution and the organizational and technological context of the firm before the implementation. Respondents were asked about the information systems and technologies the company had before adopting the SaaS ERP system, the process they have adopted in evaluating various options and why they decided on the

SaaS ERP system and the concerns they had about SaaS ERP solutions. In this context, organizational, environmental and technological (SaaS ERP software related) factors, if any, that have influenced a firm's adoption decision were examined. These factors include costs, risks, IT skills and capability, internal processes, competition, influence of external stakeholders including suppliers and/or major customers, organizational preparedness, features and functionality of the software, and inherent characteristics and advantages of adopting an integrated ERP system and a SaaS model of software delivery. The second set of questions relate to the impact the adoption of the SaaS ERP system had on firm performance and the challenges the company faced during the post-implementation phase. Specifically questions related to the impact of SaaS ERP solutions on process innovations, improvements and performance and the potential co-creation of value, decision making, and generic ERP benefits realized and not realized so far.

4 Analysis, discussion and findings

An analysis of the data collected from the case study organizations, implementation consultants and senior managers of the SaaS ERP vendor is presented outlining the influences on the adoption decision and the impact on firm performance and challenges post-implementation.

4.1 Influence of environmental factors

The influence of competitive pressures and stakeholders on the adoption decision is negligible in all the case study organizations, except Autoco. Autoco is a subsidiary of an automobile firm with its Unix based system supported by the parent company. With the loss of that support due to a change in the parent company IT infrastructure, Autoco was required to evaluate various ERP options. Industry trends, competition in the market and other economic imperatives in the environment were not explicitly considered by any of the firms, even though the trend towards modernising information systems is discernible in all the case study firms.

The reputation of the product and vendor is another environmental factor that influences adoption decision. It was important for a vendor to be of good reputation and in business" for a long time, particularly given the short life span of many software companies. Otherwise, *what if this software business is closed after we signed up?…we will be in trouble … can't afford to keep changing these vendors and software* ..." (R1, R10, R13). All the firms have carried out due diligence checks on the capability of the SaaS ERP vendor by physically inspecting data centre facilities, data security and backup measures, capabilities of the technical staff and reputation of the company in the industry. Further by checking with *the existing customers on their experiences*" (R10, R3, R8), with customers that have *changed the SaaS vendor from or to RAMCO"* (R1), and by checking *their customer relationship management processes and practices"* (R6), firms have evaluated the vendor's reputation and corporate image.

4.2 Generic benefits of ERP systems

All the four case study organizations were aware of the generic benefits of an integrated enterprise system. Common benefits managers were hoping to gain from adopting an ERP system included a standardized, integrated single view of the information, efficient capture of data at the source, automation of their key transaction processes, and improved information visibility and access across various locations of the enterprise. As noted by one manager, *now we can see the stock position from anyone of our multiple locations … earlier, I have to call the factory, and confirm stock and deliver … now without asking, I am checking myself …*" (R7). Another manager said, *today you ask me what is our customer outstanding, I will give a report without asking my finance department …*" (R2). As pointed out by one manager, *we are now able to capture data from origins … especially when we have so many locations and small small project sites … this integration is very good*" (R11). *Earlier, we were able to process and finalise our data and reports on material consumption and labor hours on 15th of every month only … but today, we can answer what is the consumption, what are the resources we have used … we can give that report in real-time at any point in time*.." (R11, R10).

4.3 IT-readiness and preparation for adoption

The role of technology-readiness before adopting an SaaS ERP solution did not play a role in the selection of the software or vendor, but it did influence the decision to adopt a SaaS based model rather than an on-premise ERP system. Only two of the firms (Steelco and Powerco) had good IT infrastructure (hardware, networks and people). All the case study organizations evaluated the options and product offerings with the help of consultants, software vendors, IT experts and senior management and prepared their firms well for adoption.

In Steelco and Powerco, accounting and inventory processes were managed using a basic system called 'Tally' and for all other transactions manual registers and books were used. These software solutions and registers were maintained separately for each location with compilation and reporting done manually at the head office on a periodic basis. Enerco used Excel and a separate older version of a stand-alone general ledger software package across its various locations, while Autoco had a mainframe Unix-based IT system in the past that

was managed by its parent company. Autoco had to search for an independent system when its parent company decided to discontinue the support to the Unix-based system. These old stand-alone accounting systems (such as Tally) were not capable of handling the business requirements and continued growth of the firm [the old system] *has no proper user interface (R1), data transfer between different departments was difficult (R1, R11), has data that is not current and accurate (R1, R4, R8, R11); processes were not efficient (R2, R7, R9, R16), batch processing and reporting was very complex and time consuming (R2, R7)*; and firms*'wanted to focus on their core job' and leave IT to experts*" (R13, R10, R6, R2). Thus, the need to improve quality of information produced and used in the firm and the need to improve process efficiency, reporting and data integration were factors that triggered the search for a suitable ERP system in all the case study organizations.

All the firms evaluated a range of ERP product offerings both on-premise and SaaS in the market as if they were 'greenfield' sites and then decided on SaaS ERP systems. Steelco and Powerco, for example, considered adopting a fully customised ERP software solution as promised by some local software companies. In the process, they evaluated solutions offered by large ERP vendors such as SAP and Oracle as well as other small ERP software vendors that included Microsoft and RAMCO. Considering their growing requirements, and potential low total cost, they opted for an SaaS ERP solution, with the option of moving to an on-premise solution in the future. Steelco, for example, wanted an on-premise ERP system, but was concerned about the high failure rates of on-premise ERP implementations and associated challenges. With most of the standard ERP systems designed for a typical manufacturing company, Powerco did not expect a standard ERP solution to meet their information system needs specific to the infrastructure industry. It opted for a cheaper SaaS model that can satisfy most of its needs and use other tools including manual tools to support other processes.

Even though SAP, Oracle and other large ERP software vendors were in the market, they provided on-premise models and did not have much presence in the SaaS space when these case study organizations made an adoption decision (in the years 2006 to 2008). Even though SAP, NetSuite and Oracle had announced their SaaS models, their presence in the India, Asia and Australasian market was *nothing much to compare*" (R6, R2). RAMCO, as a SaaS ERP vendor, did not have many major customers in the engineering industry at that time to showcase their offering. Further, by becoming a major strategic customer to RAMCO, Steelco and Powerco managements at that time believed that they could influence the development of the product to their advantage. Autoco and Enerco went for a simpler SaaS ERP offered by RAMCO, as they just wanted *a readymade software solution and did not want a complicated ERP system*" (R10, R13), given the relatively smaller size of their business units and project sites spread across the country.

Software fit to the business is also a factor. Whether it is an on-premise or SaaS based ERP, a firm must be convinced of the ability of the software and its functionality to support its business processes and add value. As noted by one senior manager, *what is the point, if it does not support our key processes … it may be cheap, it may be easy to implement … but no use*" (R2). Steelco, for example, asked the vendors to actually demonstrate some of the key processes in the software and then explain how they differed from their current processes. As pointed out by one manager, *some of the vendors don't do this and insist on demonstrating their own data … we did not shortlist them at all*" (R7). In response to the customers' need, *demonstration of the software was done at different levels of the organization*" (R17). By setting up a temporary client, the SaaS vendor would actually perform some standard transaction cycles using the datasets given by the client company and demonstrate the benefits of ERP system in general, functionality of the solution, and ease of use of the software.

Steelco and Powerco also engaged independent consultants, while Autoco used a team of experts from its parent company to analyse their process and information flows, technical conditions, pre-requisites and constraints for implementing an ERP solution in general and SaaS based solution in particular. Thus, all the case study organizations have been systematic in evaluation and selection of the SaaS solution and vendor and have thus prepared their organizations well for the adoption of SaaS ERP systems.

RAMCO's policy of deploying its own employees as implementation consultants on the sites is another factor that has influenced their decision to decide on this software vendor. In fact RAMCO, as a policy, has not employed third party organizations or consulting firms to manage their implementations unlike other larger ERP vendors. Managements strongly believed that a third party consultant would not be able to help the firms effectively. As pointed out by a manager, "*third party consultants come and go… (R2), they have no long term commitment.. (R8), they can't argue our needs, our problems, our issues effectively with RAMCO design teams and support specialists and get help.. (R1, R10), they won't have any influence with RAMCO…(R6).. they may simply say it won't work or this is not there (R6), don't have good knowledge as there are not many implementations in our industry (R6).*

4.4 Total cost of ownership and accounting shift of costs

The total cost of ownership and the accounting shift of investment costs into operating expenses were key factors in the adoption decision. This was especially so when compared

with the on-premise models and with the SaaS ERP models offered by large vendors such as SAP and Oracle. Three firms (Powerco, Enerco and Autoco) looked at the cost of requisite IT infrastructure costs and the ongoing maintenance and support costs and made a conscious decision to take advantage of the SaaS model of service delivery that shifts a *significant one time capital expenditure to monthly operational expense*" (R6). In case of Steelco, however, *cost was not the only factor*," though important (R1, R3). It viewed this as an important step in carrying out its operations efficiently. As mentioned by the CEO, in the long run, *they don't think SaaS ERP model would be any cheaper than the on-premise model" (R1)*. Rather than total cost, other factors such as *ability to access a modern and continuously improving software technology (R2), associated benefits of reputable software vendor (R1) and shifting the IT investment costs into monthly operating expenses" (R2, R13)* are considered more important.

The perceived benefits of lower IT costs though was a factor in the adoption decision for all the case study firms, who were also pragmatic about the eventual increase of these costs in the long-run and the additional IT infrastructure costs required to sustain and take advantage of the SaaS ERP capabilities. Despite the software vendors pointing to cost effectiveness as an advantage of the SaaS ERP system, none of the case study organizations believed that the IT costs would go down. Three of the case study organizations (Steelco, Powerco and Autoco) anticipated an increase in operating costs after the adoption of the SaaS ERP system and budgeted for it. While Powerco and Enerco view SaaS ERP as a permanent solution, Autoco and Steelco considered it an *interim step before they eventually move to an on-premise model*" (R1, R13) in line with their continuing growth. Autoco believed that the SaaS ERP model would cater to its basic requirements for now, but with continued expansion and growth, it would be necessary for them to go for a more complex, customized on-premise ERP model in future. Enerco, for example, *did not want to have the burden"* (R11) of an on-premise ERP system that required resources for maintenance, user support, upgrades and management on a continuous basis. Similarly, Autoco, wanted to *avoid investing in IT hardware and updating"* (R14). Similarly, all the firms were aware of their inability to attract and retain IT professionals to maintain and run an on-premise ERP solution.

Promises of faster implementation time by the software vendors were a factor in the adoption decision, but its influence was not significant. Even though all the SaaS software vendors promised faster implementation, the four firms were hesitant and did not believe this to be the case. Public knowledge of the huge failures of on-premise ERP systems and the associated change management issues made the firms aware of the challenges in ERP implementation. Management in the firms were prepared to absorb this cost of long implementation time considering the potential benefits of a modern information system in the long run. For example, in Steelco, while implementation was planned to be just 6 months as promised by the vendor, it took almost 3 years to install all the modules and deal with relevant change management issues. According to the CEO, *culture of the organization that allowed freedom and flexibility, internal politics and lack of any compelling business reason to deliver*" (R1), were the reasons for such a long implementation time. In general, it was difficult for many experienced functional experts in the organization to accept the processes embedded in the SaaS ERP software and work with the system. Even though it may not be the best way, according to senior management, they have consciously allowed a slow and deliberate process of implementation just *to demonstrate that employees are willingly falling in line and feeding the data into the system and working with it*" (R1). Using a bottom-up approach, Steelco allowed its frontline employees to take their own time to test the system, use it and work with it.

In hindsight, management would have liked the entire implementation process to be different. Steelco believed it could have given an increased role to the accounting function and managers in the implementation, and would have sought more support from the SaaS ERP vendor in terms of identifying gaps between proposed processes and existing processes, and highlighting of the changes required upfront before the start of implementation, including the changes required for the source documents design, process flow, data entry, connections, master data, controls, organizational structure, roles and reports. A senior manager at Steelco also raised the importance of *identifying the roles individual employees would play in a post-implementation environment well before*" (R3) and would have liked to *decide on and arrange relevant training on specific modules, and changes in the design of source documents, data entry, transactions and reports well before commencing implementation"* (R1). Steelco had *used adhoc approaches for the implementation, missed some of the key steps in the implementation, given too much freedom to individual managers in adopting to the new ERP system, and underestimated the importance of planning for post-implementation environment*" (R1, R2) resulting in a long implementation time and consumption of more resources than originally budgeted.

A long term relationship with the vendor rather than the 'freedom to switch' was observed to be critical in the study. The absence of 'lock-in contracts' and 'monthly subscription fees or pay per use' was stressed by the software vendors as key benefits. However, the firms now realise the difficulties in switching and the associated indirect costs of changing the processes and systems to suit another ERP system. As noted by one senior manager, *there will still be a lot of costly change management required if we decide to move to another SaaS vendor*" (R6). Therefore, the long term relationship with the

SaaS vendor is now considered critical. Given their intention to move on to an on-premise model later on, Autoco, however, believed this to be an advantage. It also realised and acknowledged the costs associated with change management if it decided to switch in the future.

Implementation time was longer because of the strategies and methods employed by the case study organizations and by the inadequate support provided by the software vendor. A lack of preparedness in terms of data quality, process understanding, and their unwillingness to push through the changes fast delayed the implementation. Similarly, from the software vendor side, inadequate identification and advocacy of the changes required for effective implementation in each of the case study organizations contributed to longer implementation time.

4.5 Perceived fear of security, regulations and service disruptions

The study found that security and privacy of data, fear of service disruptions and disaster recovery were not concerns for the four case study organizations. Contrary to past studies, firms were quite positive about the capabilities of the SaaS ERP vendor and genuinely believed the security of their data would be "far" better if managed by the SaaS ERP vendor rather than themselves. Given its demonstrated capabilities, its self-interest to maintain its reputation, and because IT is its core business, the SaaS ERP vendor was considered more capable of delivering a secure environment to the firms. This conclusion, however, was formed based on due diligence checks carried out by the firms before deciding on RAMCO. Representatives of each of the four firms visited RAMCO's data centre and checked the security infrastructure, the way data was managed, and the way it was resourced. As pointed out by a RAMCO consultant and agreed with by the Steelco manager, "*each client's data is stored in a secure locker … it is like a bank and RAMCO is not bothered what is stored in the locker*" (R16, R5). It is safe to "*keep the data with RAMCO data centre … it's like keeping jewellery in bank locker than at home*" (R16). Given the robustness of security infrastructure, there is also no possibility of data falling into the hands of competitors when they both are customers of RAMCO (R17).

The case study firms did not have the capability and infrastructure to keep the data secure. As pointed out by Steelco, it had *"neither resources nor technical and managerial capability to keep the data safe and up-to-date with the data storage and management technologies"* (R2). "*We are not data storage and technology experts, and about the viruses and other security issues we don't know who will do what … and it is a secondary thing to us … we know our primary business—power infrastructure, that's all."* (R8), a Powerco manager stated, that management "*even though can take an insurance and invest in backup hardware, are not capable of regularly doing upgrades, being informed about the developments in technologies (R13), and preventing any outside virus attacks* (R8). Even if a catastrophic incident occurred with data losses for reasons beyond RAMCO's control, the four firms believed the vendor was "*more capable of recovering and backing up the data securely and deliver continuity of business"* (R1) than the firms themselves.

Another feature of the SaaS ERP software is its ability to ensure compliance with regulatory and legal requirements. For example, value added tax, sales tax and excise duty vary from state to state, and product to product, and the software ensures full compliance with regular updates and enhancements. As noted by a manager, "*we don't worry … it is all set … the system won't allow us to proceed with invoicing without adding the tax … it is good*" (R1), and "*configuration gives us the option of not adding this tax when we are working on a material issued by our parent company…*" (R13). Thus, the system ensures full compliance, accommodates varying contexts and enables production of necessary tax reports for auditing and government reporting purposes.

Overall, all the four firms are satisfied with the services offered by RAMCO since the implementation of ERP solution and did not experience any service disruptions. Other than some disruptions of service at remote locations (for Enerco) because of limited bandwidth the firms did not face any IT software and infrastructure related challenges at the time of the study.

4.6 Change management—a challenge

Educating users, discovering, understanding, learning to use and actually using the capabilities and existing product features were identified as key challenges of the post-implementation environment in all firms. With time, understanding of the SaaS ERP solution's capabilities, features and functionality improved in all the case study organizations. For example, after 4 years of use, Powerco is able to "*use about 70 % of it, gradually improving from 50 % when it was implemented"* (R6). "*Educating users on the information flows, documents and controls*" (R6, R8) in the system was a challenge and took almost 6 months after going live for Powerco management.

There are several challenges identified in the study—"*a genuine problem with the software solution … or an attitudinal problem with the change proposed by the system, or lack of process understanding, or inadequate knowledge of product functionality and features*" (R1, R6). For successful implementation and effective use of the capabilities, "*some changes to the process steps/sequence are required (R3), new activities need to performed (R6), some people may be replaced (R1), some jobs may significantly change (R1)*, some *people may lose access and control (R1, R10, R3), while others gain access and visibility*" (R1, R6, R8). All these

challenges are change related and challenges the firms had to deal with.

Unless the customers have full confidence in the vendor and the vendor is prepared to be approachable and helpful, firms will face challenges. Often vendors want users to simply follow instructions but customers would say, "*I have never worked with you, today you are asking me to trust you fully, how can I do that*?" (R6). As suggested by Steelco and Powerco, the vendor must provide "*what are their processes, demonstrate their processes to all stakeholders (R1, R6) … show them how the transactional data is entered, processes, reports, controls etc … and deal with them from time to time throughout the project …*" (R1). All the firms considered it important for the vendor to provide such assurance and involve themselves from the planning stage to the final 'go live' stage. As pointed out by Steelco, both the vendor representatives (consultants) and the senior managers in the client firms must be trained in change management.

Flexibility demanded by some of the users and the change management associated with that is another challenge observed in this study. All the case study organizations are aware of the occasional variants in the process required. As noted by one manager, there is a difference between flexibility and variation or deviation, "*we want process to be strictly followed and in the name of flexibility, we don't want individuals to vary the process at their will*" (R3). But in the case of any statutory and regulatory changes forced externally, the software vendor automatically takes care of that and continues to deliver a product that conforms to regulatory and compliance requirements. Sometimes users in the firms misuse the term 'flexibility' and seek deviation of the process for their own convenience and complain that the system is not functioning the way they would like it to function and/or the way previous processes functioned. In these instances management refers these issues to the implementation consultants who, after discovering the reasons, advise the users on the benefits of using the superior features available in the system and explain the benefit of adhering to standardised best practice processes. If such a solution is not available in the system, then the matter is referred to the software vendor to develop a workaround in consultation with the users. Thus, "*as long as the software vendor agrees, we allow some workarounds and some variations to the process, otherwise we don't*" (R3).

All the case study organizations were aware of the potential of the SaaS ERP system capabilities and believed that its value would increase with time and with increased usage. As pointed out by a manger in Steelco, "*we are moving forward—first capturing all the data … second integrating all data, thirdly reducing the duplication of activities in the organization, and by simplifying the reports*" (R3). As noted by another manager, "*we are using around 70 % of our system capabilities now … before that we were just using only 50 % … we were not knowing so many functionalities* (R8). Ease of use is an issue and to derive full benefits of adopting a SaaS ERP solution, employees must be able to use the system effectively.

Convincing the users to accept the integrated nature of the system was a challenge initially to all the firms. There was a perception of loss of control initially when the information was accessible and visible to all the departments. As pointed by the RAMCO consultants, even though "*we have multiple flavours of a business process, you cannot violate and bypass the process completely … for example you can't sell something without any invoice …*" (R15). "*Integration always comes with some checks and balances and some controls*" and "*if you don't have an integrated system, you won't get any meaningful output*" (R16).

As acknowledged by managers, ERP systems bring a significant organizational change in "*business processes, job roles and responsibilities, reporting relationships, workflows, transactional processes, sequence of process steps, reporting process, reporting formats, rules*" (R2, R4, R8, R11, R13) and good end-user training on the transactions, screens and reports is necessary. Accordingly, all the firms have sent their key users for extensive training at RAMCO. However, more was needed at two of the firms, given changes over time and some employee turnover.

As mentioned earlier, the shift is not just in the way information is searched. It increases the access to operational information that belongs not only to one's own individual department's (functional or role specific) world, but also to other departmental data that was not previously visible. This can at times be overwhelming if employees do not know what to do with this newly discovered organizational knowledge. As pointed by one senior manager, "*this is a big challenge … they were not used to seeing so much information, do not know what do to with it (R1) … don't have enough training … do not have skills to assist in decision making (R6, R10) and some of them don't want to get involved in decision making at all …(R1, R11, R13).*

4.7 Improvements, value co-creation and decision making—impacts

The willingness of the SaaS ERP software vendor to consider improvements required by the individual firms had a strong influence on the adoption decision of all the case study organizations. These improvements were delivered through product enhancements, discovery of hidden options and functionality, configuration of options and processes, and customization of the software. While all the firms have configured the system with the help of the software vendor, two of the four firms sought customization. Each request for customization was evaluated by the vendor and added to the standard product functionality if it believed it would add to the capabilities of the product in general and could be used by other customers. If the request was very specific to the firm and the

software vendor did not think it added value to the product functionality or improved the product, and would not potentially be used by other customers, the software vendor refused such requests. This has caused some tensions in Steelco and Powerco, but the implementation consultants (SaaS vendor) worked with the managers to resolve the issues. On certain occasions, they have developed "*workarounds that involve use of excel, import and export of data, a simple reconfiguration of the software, and/or pointing out the features in the software"* (R15, R17, R9, R5) that would meet their requirements. Often users were not aware of the capabilities and functionality of the system and "*looked for something similar to what they already had"* (R17, R15). The software vendor was able to advise the clients in these instances. As stated by the head of RAMCO implementation team, "*because of non-integrated system, your employees were doing this, but now with this integrated system, you can get the report ... which is better than what you have been doing so far*" (R15). This is how RAMCO implementation consultants would "*convince the management and make them use ... and slowly get their approval for the new way of working*" (R16).

The implications of, and limits to, improving and redesigning a standard SaaS based product's functionality to suit the individual firm's requirements were not fully known at the beginning of implementation. For example, simple customization in terms of additional screens, searching mechanisms and new reporting formats were requested by all the case study organizations and readily addressed by the software vendor. Similarly, some bugs were noted as the company was using the software, but "*these bugs were immediately rectified by the RAMCO support team, sometimes within a couple of hours and sometimes within a day*" (R11). When the software vendor was convinced that the customization or changes to the software requested by their clients "*could also be useful to other customers in future, those improvements were incorporated into the standard functionality of the software*" (R15). On other occasions, the vendor suggested some workable solutions, instead of changing the software. In the case of Powerco, Steelco and Enerco, for example, changes to the product were not made, when some of their "*requirements were considered unique, firm specific and not generic*" (R3, R7, R10, R1, R16). Instead, the software vendor worked with the firm and helped them meet their requirements through "*another feature already available"* (R2, R9, R4, R12) in the solution, or developed and implemented workarounds outside the system. The information generated through these workarounds were processed in batches and entered into the ERP system. With experience and good communication with the software vendor, these firms were able to recognise any problems and bugs in the system and work with RAMCO in developing solutions.

Powerco held the view that RAMCO would continuously invest and build their SaaS ERP product to incorporate all the developments and changes in technology, business and regulatory requirements. As pointed out by its senior manager, "*customising a solution to Powerco's unique needs will push the responsibility of updating and modifications on to Powerco itself*" (R7). As noted by the CEO, "*we are its first client in the infrastructure industry sector ... by taking an active role, we will have the opportunity to find solutions to our own problems as well as directly contributing to the overall improvement of the product*" (R6).

Enerco, similarly, requested some "*changes to the print format and reports and some additional screens in the production module to capture power production"* (R10) and the vendor incorporated them into the product. Autoco sought some changes to the processes embedded in the software, some additional reports and reporting functionality. The SaaS ERP vendor agreed to make the changes to the standard product and delivered them to the company; they are regularly upgraded on a continuous basis. This could, however, become an issue if the customer does not want these changes to be continuously updated, especially if the feature substantially changes making it difficult and complex for the customer to work with. As noted by senior managers, "*such instances where improvements/changes are ... pushed on to us ... that we don't want ... so far ... are very few*" (R6, R3). But this is a possible problem in the future, "*if they keep on incorporating all and sundry changes requested by various customers ... it will make it very complex"* (R2, R8, R10) and "*our life difficult" (R3).* But as pointed out by a senior manager at the software vendor, "*we don't blindly add those features or change them ... we have a long process of approving such changes*" (R17). In fact, "*less than 10 % of requests are approved*" (R17). Accordingly, such requests for new feature or functionality are evaluated by the implementation consultant and resolved by either finding a solution within the existing system or by convincing the users to achieve their objective through workarounds.

If RAMCO has engaged third party organizations and consultants for implementation, the potential for improving the product offerings and thereby meeting case study organizations' requirements would not have been good. As noted by managers a third party consultant "*will have no influence with RAMCO product development team (R1)..won't be sympathetic to our needs (R3).. will say no easily without even trying (R7), won't pass on the pressure we are putting on him (R6), will charge more (R13).* It is believed that the firm is *"sure we won't get these additional functionality and reports we got" (R1)* if the implementation consultant is from another organization.

At the time of the study the adoption of SaaS ERP had not yet made a noticeable difference to the decision making

processes in the case study organizations. Steelco, for example, suggested that information visibility, a centralised view of information and its accuracy, "*are helping to make quality decisions based on data"* (R1 and R3), but it had not reached a stage of decision making that would contribute to profitability. Powerco outlined that its impact on decision making processes should be "*positive and will be felt soon*" (R7). With a discernible increase in productivity and efficiency improvements, Powerco believed their SaaS ERP system would easily manage "*expected strong growth in business turnover to $50 million (Rs. 300 crores) from the current levels of $20 million (Rs. 120 crores)*" (R6). "*Centralised data, ability to access the system and work from anywhere and ability to freeze the process flow'* (R1, R3) are considered the major benefits identified by Steelco. Though these could potentially help in decision making, it had not yet identified a noticeable "*impact on strategic issues or on managerial decision making*" (R1). As noted by managers, "*SaaS ERP is transaction-centric ... has no analytical capabilities (R2) ... the ERP system will capture data in the process, stores it in one central location for easy access* (R5*). It needs "to be analysed and reworked before presenting it to management*" (R13). But some signs of improvement in decision making processes are noticed and managements believe adopting a suitable business intelligence solution later would help them further in that.

4.8 Conceptual model

Analysis of data, as discussed above, revealed the influence of several factors on the case study firms' decision to adopt SaaS ERP system. Environmental factors such as competition, industry and government regulations, that are part of a TOE framework, have no impact on the adoption decision of firms and therefore are not included in the conceptual model developed. According to this study, factors that relate to software vendor, generic characteristics of SaaS ERP technologies and internal organizational factors have a positive influence on a firm's decision to adopt SaaS ERP systems. Vendor related factors identified in this study include perceived vendor reputation, perceived ability of the software vendor to provide customer service and support, to offer opportunities for value co-creation and to ensure compliance with regulatory requirements. Similarly, technology-related factors identified from this study include perceived benefits of ERP systems, accounting shift of costs and configurability of the software, and internal organizational factors this study revealed include information technology readiness of the firm, business software fit and willingness and ability of the firm to deal with change management issues. A conceptual model depicting the relationship between various factors and a firm's decision to adopt SaaS ERP systems is presented below.

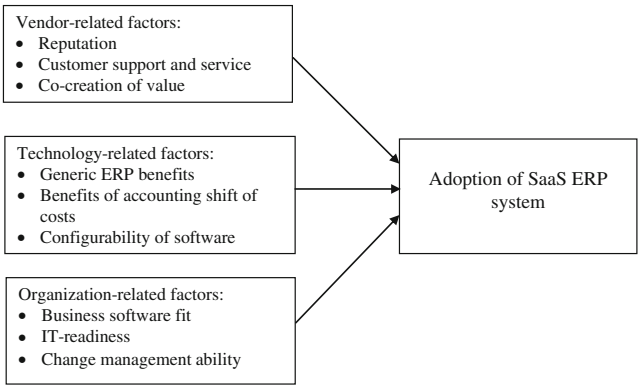

Figure 1: Conceptual model of SaaS ERP system adoption

5 Conclusion

SaaS ERP systems are considered the best option for SMEs to take advantage of the benefits of ERP systems, without the associated prohibitive costs of IT infrastructure, skills, software, upgrades, and maintenance. According to this study, the reputation of the software vendor, the willingness of the SaaS vendor to work with the customer throughout the implementation stage and afterwards using their own employees as consultant and the ability to shift capital expenditure to operating expenses are some of the key determinants of the adoption decision. Although the total cost of ownership may be low in the short run, an on-premise solution would be comparatively less in the long run. With its ability to connect employees spread across the globe through the Internet, a SaaS based ERP solution can deliver real-time data, visibility and standardized processes and information, and help in collaboration and improved performance. Reputation of the vendor, functionality of the software and ease of use are important factors when deciding on an ERP solution, but managements are aware of the costs and challenges of customization. Even though firms are aware of the competition, external competitive pressures and/or trading partners' requirements, they were not found to be influential factors in their adoption decision.

Dispelling some myths surrounding security issues, the study found that security and integrity of data stored at the SaaS vendor is considered safer and more reliable than at the firm's own premises. Further, possible disruption of service failures was not an issue for the case study organizations given the technical superiority of the SaaS vendor and its robust backup mechanisms and service continuity measures. Instead, SMEs are more focused on how well the software 'fits' their business processes, its functionality and features, willingness of the SaaS vendor to listen to and work with them in improving the product offerings, and opportunities for co-creating value in terms of process improvements and innovations throughout its life cycle. Although the firms are not locked into a contract with the software vendor it is not easy to deal with the change management related issues in case of a switch

from one vendor to another. Therefore, it appears enterprises do not consider this as an important benefit in their decision and are looking forward to a long standing relationship with their SaaS ERP vendor.

This study makes an important contribution to the literature by explaining the determinants influencing the adoption of SaaS ERP systems and by highlighting the importance of the evaluation process, accounting shift of investment costs to operating expense and challenges such as change management and value co-creation. This study fills an important gap in the research on enterprise systems that so far tended to focus primarily on large firms and on generic cloud computing issues rather than SaaS ERP systems. The study, however, has two limitations. First, it is limited to one SaaS ERP software vendor, customers in one country and therefore has limited generalizability in terms of its findings. Secondly, the use of a cross-sectional field study, while methodologically better than a single case study and cross-sectional survey – two extremes of the continuum — suffers from the limitation of drawing definitive conclusions and findings that are embedded in context. Further studies on other SaaS ERP products in other countries and a comparative analysis will offer deeper insights and further refinement of theories.

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Dr. Ravi Seethamraju Currently working in the University of Sydney Business School, Ravi teaches and researches in the areas of enterprise systems, process management and business education. With 10 years of corporate experience prior to joining the academe, his research is industry-relevant, multi-disciplinary and explores the evolving relationships between IT-enabled innovations and performance in organizations and supply chains, and the role of those innovations in enhancing teaching and learning experiences of students, and well supported by several competitive research grants. His work was published in Business Process Management journal, International journal of electronic business, Australian accounting review and Journal of Information Systems Education. He has a PhD in management, a graduate diploma in adult education and masters in industrial engineering. He currently chairs Supply Chain Council ANZ and has an active engagement with industry and practice.