SaaS Enterprise Resource Planning Systems: Challenges of their adoption in SMEs

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Abstract — As more and more organisations move from on-premise to on-demand software solutions in order to minimise overhead costs, the Enterprise Resource Planning (ERP) providers begin to offer their well-established best business processes as cloud based IT solutions. As a result, ERP software previously reserved for large organisations mainly due to heavy costs associated with the initial purchase of the software, its licensing costs and subsequent configuration and maintenance, begins to open up to Small and Medium Enterprises (SMEs). With more and more Software as a Service (SaaS) ERP solutions on the market, SMEs are beginning to consider and implement these solutions as opposed to in-house developed applications, in a bid to offer better customer relationship, gain new markets and increase profits, amongst other benefits. As this study reveals, while deployment model is a key advantage in enabling organisations to minimise costs, certain critical factors as well as some barriers need to be addressed to enable organisations to successfully implement these systems. This paper aims to identify and evaluate common problems experienced in the implementation as well as post-implementation stage of Software as Service ERP systems by Small and Medium Enterprises. Qualitative data was collected from five European and US companies, which implemented SaaS ERP, by means of a set of semi-formal interviews and online questionnaire.

Keywords - Enterprise resource planning (ERP), Software as a Service (SaaS), Small and Medium Enterprises (SME), Critical Success Factors, SAP

I. INTRODUCTION

With the advent of scalable on-demand software solutions, more organisations are beginning to make the strategic shift away from on-premise software solutions. This is largely as a result of being able to minimize overhead costs and provide real time services to customers. To this end, ERP software providers are promoting the adoption of this technology as a means of offering well established business processes as cloud based solutions.

The mode of deployment is touted as one of the greatest advantage of on-demand enterprise resource planning systems. This is because it enables organisations to transfer costs of ownership and maintenance to the service providers. However, despite the benefits of cloud based solutions on which this technology is built, the rate of adoption is not as high as expected. Moreover with recent reports of the security of cloud based solutions being breached, organisations seem to be wary of adopting cloud based enterprise solutions. The critical success factors and the barriers to overcome for successful adoption of this technology have not been fully understood. Identifying and promulgating such risk factors would further enhance the diffusion rate of cloud based enterprise solutions and enable more organisations implement these solutions.

While existing research on the critical success factors for implementation of traditional enterprise resource planning solutions exist, there is little research on the factors pertinent to successful implementation of cloud based solutions. The variance in the architecture of traditional and on-demand enterprise solutions necessitates the need to identify the factors which enhance adoption of on-demand solutions. The aim of this research therefore is to increase the awareness of the critical success factors for adoption of cloud based enterprise solutions. The barriers and impediments to adoption will also be identified. The research will focus on small and mid-sized enterprises which have recently adopted SAP Business ByDesign, as this industry sector constitutes the largest subscribers to cloud based enterprise solutions.

II. SMEs AND ERP SYSTEMS

Small Medium Enterprises play a vital role in the economies of countries and constitute the core of economic growth [1]. With the current economic recession, the rise of SMEs has increased due to a growth in the rate of self-employment. Looking at the United Kingdom only, the economy is driven mostly by a large number of SMEs. We can observe that this trend is global and SMEs form the backbone of the economy, and contribute to the gross domestic product of the nations in which they operate.

A. Challenges SMEs face in their operations

Globalisation and technological advances have contributed to increasing competition in ensuring sustained existence of SMEs [1]. However, due to restricted access to Government funding and budget cuts most SMEs have limited funds. They operate in unfriendly business environment which is more favourable for large organisations. A huge number of SMEs are plagued by low managerial skills and a lack of access to modern technology.
To this end, SMEs face the daunting task of grappling with the lack of resources and infrastructure to succeed at all cost. This lack of resources has resulted in loss of customers, and the demise of several of such business due to the current economic recession being experienced globally.

In addition to the aforementioned factors, SMEs struggle to make the shift from core manufacturing to service, to enable them remain competitive. They are often limited in terms of the scope of activity and operations. As some of these organisations are family owned, the owner usually has a strong influence on the organisation.

Therefore to be able to compete with large firms, SMEs need to be able adapt to change and become more responsive [2]. Addressing these challenges from a technological point of view ultimately means that for a more competitive position, a fundamental change in the way these organisations currently operate is imperative. To this end, many SMEs are now beginning to consider the use of technology and ERP systems to improve their performance and enable them compete on a global scale with larger organisations [3-4].

B. Software-as-a-Service ERP

Due to the cost structures of ERP systems, many of these SMEs are unable to afford the traditional ERP systems. Thus as ERP vendors begin to offer Software-as-a-Service ERP solutions.

Software-as-a-Service involves a third party provider, supplying capacity, software, applications and services via the internet on a pay-as-you-use basis. Therefore rather than install and maintain software, SMEs can simply access whatever service they need directly from the internet. This frees them from the responsibility of complex software and hardware management. Software-as-a-Service offers a variety of options from basic applications, such as word processing sheets; to more complex applications, such as customer relationship management and enterprise resource planning applications.

In SaaS ERP systems, the applications are hosted and maintained by third party service providers. This is in sharp contrast to traditional ERP systems which require the installation of software on individual machines. They provide organisations with the opportunity to utilise the applications on more affordable pricing structures with low total cost of ownership (TCO). Due to the application being hosted by a service provider or vendor, operation and infrastructure costs are borne solely by the service provider, allowing the organisations to only pay for what they utilise. Moreover organisations no longer need to be inundated with time consuming and expensive upgrades. Thus more SMEs are beginning to explore the adoption of SaaS applications at a fraction of the cost of acquiring the whole equipment, software, or expertise.

Example of such system is SAP Business ByDesign which runs on Web Applications and requires Java Runtime Environment, Adobe Reader and Flash player as well as Microsoft Silverlight. Supported internet browsers include Microsoft Internet Explorer, Mozilla Firefox and Safari. The modular and flexible nature of the application makes it easily configurable or modifiable to suit the organisation’s needs. Additional costs are not incurred when organisations implement additional features or applications, which is a major advantage over traditional on premise ERP systems.

C. Opportunities for SMEs of introduction of affordable ERP packages

Reuther and Chattopadhyay [5] posit that ERP systems serve as business tools which can be used by SMEs to enhance growth. However, there is a need to differentiate between the financial and non-financial benefits, which may be accrued from adopting ERP systems in organisations. Financial benefits may be classified as return on investments or reduction in impact to cost statement. Non-financial benefits may include organisational effectiveness and efficiency, measured against reduction in customer complaints, and improved decision making. ERP systems enable SMEs to be more responsive to market dynamics [6].

Huang et al [7] state that ERP systems, improves business processes and increases the organisation’s value. It is therefore an important element of the infrastructure of modern businesses in aiding the organisation attain competitive advantage in a digitally empowered environment. ERP systems support efficient operations of business processes thereby making the organisation more competitive. Through the integration of disparate business functions, exchange of data and information across various divisions is promoted. Thus as information is shared, the organisation becomes more flexible and performs more efficiently and effectively [8].

ERP systems promote flatter organisational structures and enhance decentralised decision making. With a flatter structure, the flow of information is enhanced, enabling the organisation to be able to produce accurate and apt information, which improves decision making. ERP systems also result in improved customer service [9], lowered inventory levels and enhanced global operations [10]. Without assessing the critical success factors, organisations will fail to fully obtain the benefits which may be accrued from its adoption [11]. Furthermore, these organisations will have higher rates of failed or unsuccessful implementations.

Where previously SMEs lacked the ability to support global operations, SaaS based applications now provide a means by which these organisations can compete on an equal ground with larger organisations. Some of the advantages of Software-as-a-Service include, low cost of ownership, as the user simply pays for what has been utilised. Users are able to select the applications where access is required, as against owning or acquiring the product. It enables organisations reduce computing costs from hardware and infrastructure perspectives. This ultimately results in innovative and sustainable applications.
SaaS provides access to latest technology and agile updating as system upgrades are executed seamlessly.

It enables organisations carry out data transactions along value chain activities such as sales and distribution and customer relationship management [12]. It provides online real time benefits and better support from the application vendor, without the need for round the clock staffing. Moreover, the time to market, is faster than with traditional software services, as the applications can be accessed via a web browser. Thus implementation is fast and without IT hassles. In addition to the already identified advantages, SaaS provides organisations with shorter contracts and IT capabilities delivered as a service which enables organisations focus on their core competencies and makes them resilient to external threats. It places an organisation in a position to take advantage of profitable opportunities and respond adequately to the dynamics of markets, its customers and competitors.

D. Challenges of ERP adoption

Despite the many business values of ERP systems, implementation of this application is being plagued by failure. This is as a result of certain factors which make for successful implementation being disregarded. Vilpola et al [3], states that this is largely due to the misfit between the business processes and ERP system logic.

Considerable research has been carried out to investigate the critical success factors pertinent to the adoption of on-premise ERP solutions in organisations. These factors if adhered to could ultimately result in increasing the number of successful ERP implementation. Li [13] amongst others identified critical success factors which could be used by prospective firms when considering ERP adoption. These include:

- Top management support
- Change management plan
- Training and education
- Project management
- Vendor selection
- Dedicated resources
- Organisational culture
- Technological readiness
- System design and configuration

However these factors focused solely on traditional ERP systems. A recurring theme identified from the review of past research is the importance of management support and the implementation of an effective change management strategy. Aligning the ERP system to the business processes within the organisation has also been emphasized in ensuring successful implementation.

Other factors such as user training, lack of dedicated resources and over customisation of the application have also been found to inhibit successful implementation. Without proper training, the users will not know how to utilise the system, this would result in low buy-in or the users simply deciding not to use the application. ERP systems tend to be somewhat rigid as they only permit a certain level of customisation [14]. Organisations who insist on customising the application to suit business processes often report failed implementation, due to an unwillingness to implement changes within the organisation.

Therefore these factors must be taken into consideration by organisations adopting ERP systems to ensure successful implementation of the application. Thus, in light of the business values to be gained from implementing ERP systems, there is a need to identify these factors with relation to SaaS and SMEs. This will enable SMEs better address the critical success factors that affect successful implementation.

III. Methodology

As part of this research qualitative data was collected from organisations that have been successful in implementing SaaS ERP projects. These data was used to investigate what are the key factors affecting implementation, as it is considered important for the ERP research and practitioner communities to understand what makes a successful on-demand ERP system implementation.

Data was collected through formal interviews and questionnaires. The interview protocol consisted of open-ended questions which allowed the respondents to enunciate their own opinions. For the purpose of this research, frequency distribution, measures of central tendency and descriptive analysis were performed in the analysis of the data obtained. The frequency distribution was based on counts of values. Measure of central tendency which count the commonly reported values was then performed. The most frequently occurring variable is a true indicator of the central tendency of a variable. Finally descriptive analysis was used to summarize information about the average values in a particular data column.

However, efforts to have data values from each of the respondents proved abortive. This resulted in missing values in some data sets. Missing values occur in three different patterns, missing completely at random (MCAR), missing at random (MAR) and missing not at random (MNAR). The extent and pattern of the missing values in this research was missing completely at random (MCAR). To address the problem and reduce the risk of bias, the researcher adopted the mode substitution imputation method. The most frequently occurring values were used to replace missing values.

IV. Learning from SME’s using ERP SaaS

A. Company profiles

The criterion used in the company selection process was that the companies be small and midsized organisations which had implemented SAP Business ByDesign. All the companies selected have the basic characteristics of SMEs. The total number of employees ranges from fifty to a little above three hundred persons. The total number of
employees in the information technology (IT) department is limited. The services these SME’s offer range from manufacturing through professional to financial services.

All the companies have a record for innovation and continuous improvements in common. However, the barrier of entry for new entrants into the sector is extremely high. A common feature shared by these organisations is the large customer base and the location of branches worldwide. Moreover, since these organisations operate in highly dynamic markets, being able to react to market changes is a key requirement to ensure sustained operations. This global operation results in disparate systems in each of the business offices. Therefore being able to manage growth and improve customer service, has led these organisations to consider ways to increase; commitment to customers, innovation and improve business processes.

B. Key factors affecting implementation

When asked what were your organisation’s major concerns when considering adoption of SAP Business ByDesign, 60% of the companies, said that the fear of being able to customise the application to suit the business needs was a major concern for them. Major concern for 40% of respondents was associated with the technical performance of the system such as application performance and Integration with other systems. For 20% of the respondents, risk of vendor lock in, loss of control, and security were sources of concern. The ability to meet government and industry standards was not seen as a concern, as none of the respondents selected this option. Full companies’ responses to this question can be found in Figure 1.

This in turn led to investigation of factors which companies value as important criteria in the implementation process, which enhanced successful implementation of SaaS ERP systems. The starting point for this analysis were previous research projects which investigated Critical Success Factors as applied to large enterprises which implemented proprietary ERP solutions such as SAP ERP. The results of this investigation can be found in Figure 2.

Looking at it the majority of the companies indicated the importance of having a change management plan in place. Communicating with employees prior to implementation resulted in more successful adoption. Change issues such as, training concerns, changes in job roles and reduction in employee numbers should be managed effectively. This would serve to ensure that employees “buy-in” to the application. Failure to achieve employee buy-in would result in high rates of non-utilisation. Therefore organisations should focus on managing employee transition to the new system appropriately.

Irrespective of the simplicity of the application, there must be adequate and frequent training provided for the users. Organisations who were properly trained in the use of the application reported increased performance and successful adoption. The emphasis of providing user training should be on the business processes and not necessarily the technical aspects of SaaS ERP Systems. This will make the users more adept in utilising the applications, and result in more organisations willing to adopt it.

The provision of vendor support during the and after the implementation proved valuable to the organisations surveyed. This enabled better transfer of knowledge between the users and the vendors. It also enabled the organisations address “teething” issues at the early stages of the implementation. The inclusion of various basic help features and knowledge database in the opinion of the respondents also enabled them to better adjust to the application.

The use of cross functional project teams should be encouraged in the implementation process. All the organisations surveyed utilised dedicated project teams. In some of the organisations, it was found that the size of the project team affected the success of the implementation. Therefore organisations should strive to limit the number of members of the project team when implementing SaaS ERP Systems.
The selection of skilled technical experts is a major factor which enhances the success of the SaaS ERP implementation in organisations. However this should be used with caution, the use of consultants should be limited to the feasibility phase. The organisations should focus more on the functional coordination and less on the software issues. This will enable them form better collaboration and coordination with the consultants.

Allocation of a project champion to oversee the implementation proved successful in the organisations surveyed. The project champion served as a liaison between all the stakeholders involved in the implementation project. This enabled the organisations to focus on other aspects of the implementation. It also ensured that the process and approach were consistent with the project scope, thus ensuring the successful delivery of the implementation project.

Finally as this research identified assessing existing data and applications was a major determinant of the successful adoption of SaaS ERP Systems. Failure to consider the existing data and applications would result in a misfit between the application and the organisation. The data collection revealed the importance of assessing this factor in the pre-implementation phase. This would ensure a trouble free implementation and also reduce the possibility of modifying the application to suit the business processes or vice-versa.

V. CHALLENGES OF IMPLEMENTING ERP SAAS IN SMEs

Following the survey, the list of challenges associated with the ERP SaaS systems implementation has been formulated based on the companies’ responses. This can be now grouped into categories as follows.

A. Usability

While the product has been touted as being easy to use, respondents reported otherwise. Eighty percent of the organisations surveyed ranked usability as average and poor. A recurring criticism was that the system was difficult to use and slow. Some users complained that the application was not perceptive to the tasks being executed. The factor described above culminated in a misfit between the software and business operations and vice-versa. According to the TAM framework and the seven dimensions of measuring adoption [15], the easier the application is to use, the higher the adoption rate would become.

B. Functionality

Despite the application being designed for SMEs, it proved too rigid and complex for the business processes in these organisations. This resulted in a divergence between the business and the SaaS ERP application. The gaps which exist between the application’s functionality and the requirements of the organisation must be identified and bridged. This will enable more organisations overcome this barrier of adoption.

C. Reliability

Despite the updates and application upgrades being executed seamlessly, there were high reports of service interruption afterwards. Respondents complained of having to re-acquaint themselves with the application after every system upgrade. This was because proper documentation detailing changes to be expected were not adequately communicated by the vendor to the users. Furthermore, reports of the application failing occasionally were also highlighted by respondents. Therefore the reliability of the application could not be depended on by the users. As a result of this, the users were found to contact the vendor helpdesk more frequently once upgrades were executed.

D. Compatibility

Integration with and support for various operating systems was established in the responses received as a reason why some vendors were discarded. Although SaaS ERP systems are able to run on various smart devices, with the increased adoption of “Bring your own device” by organisations, vendors need to identify ways of enhancing the product offerings to support these diverse applications and devices. This will enable users obtain the maximum benefit achievable and further enhance the adoption by organisations.

E. Serviceability

While upgrades and system updates were executed seamlessly, users complained that the application failed occasionally and this was heightened especially after upgrades and updates had been executed. Therefore the use of service level agreements should be adopted to define contractual agreements for training and updates. This will provide a benchmark with which the vendors can evaluated on in terms of services offered to the users. In addition to benchmarking, the quality of service offered to the organisations should be enhanced, which will result in higher user satisfaction.

VI. CONCLUSIONS

Following an extensive review of the literature, this research can be described as one of the first attempts to identify the key factors that, in the views of small and medium-sized organisations, determine success of SaaS ERP Systems.

The authors conducted a rigorous process of identifying key SME’s which have become early adopters of SaaS ERP Systems in different countries. Direct interaction with the staff in charge of implementing and using SaaS ERP Systems at those organisations enabled understanding of key issues which are likely to inform the work of ERP researchers, developers and users alike.

Not only were those factors which are critical for the success of implementing traditional ERP systems explored. The analysis was extended to the cloud-based features of SaaS ERP Systems and their value for small and medium-
size organisations. Factors such as the deployment model of SaaS ERP Systems were perceived as advantageous over implementation of traditional ERP systems. The model results on critical information being closer to the decision maker which was perceived as a driver for collaboration within the organisations, potentially leading to enhancements in product and service innovation.

Key factors perceived as having a negative effect in adoption of SaaS ERP Systems included the limitations in their usability and reliability, as well as their failure to provide SME’s with the flexibility required by the highly dynamic environment where they operate.

The research has therefore paved the way for further improvements in an area that is perceived as a key driver for business development and innovation.

VII. FUTURE WORK

The research has studied the views of early adopters of SaaS ERP Systems in order to understand the importance of such systems for SME’s, as well as the factors that determine their success.

On the basis of the investigated evidence-based practice, participants in this research have confirmed the need for a conceptual framework for implementation of SaaS ERP Systems in SME’s which considers not only the critical success factors identified but also the lessons learned from practice in those organisations and current developments in the field.

Such a framework, to be developed in collaboration by different stakeholders, is expected to provide strategy as well as policy recommendations for implementation and use of SaaS ERP Systems in SME’s.

VIII. REFERENCES