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Software-As-A-Service (SaaS) : A New Generation Enterprise Resource Planning Tool in the Modern World

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Abstract

The world is changing very fast in terms of enterprise systems and industries need very specialized solutions. Industrial problems are very complex and need lot of money and efforts. Availability of expertise and skills causes another problem in the industry. Business applications are increasingly prevalent in the Small and Medium-sized Enterprise (SME) sector. Business vendors are targeting SMEs but many projects fail due to poor planning, lack of resources, organization immaturity and failure to understand the complexities of integrating such applications with existing business system

Inside the promotion of distributed computing, Enterprise Resource Planning (ERP) frameworks conveyed as Software as a Service (SaaS) is getting more concentration from ERP sellers. ERP merchants have for a long time created and sold ERP as 'standard programming' that fits the necessities of numerous organizations, and now SaaS as another way to deal with convey programming has developed. In this examination the offers of programming as an administration from an ERP merchant's viewpoint is investigated.

Keywords: *Enterprise Resource Planning, SaaS, Cloud computing, systems.*

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1. INTRODUCTION : ENTERPRISE RESOURCE PLANNING (ERP)

It is the integrated management of main business processes, often in real-time and mediated by software and technology.ERP is usually referred to as a category of business management software, typically a suite of integrated applications that an organization can use to collect, store, manage, and interpret data from these many business activities.

a) ERP provides an integrated and continuously updated view of core business processes using common databases maintained by a database management system.
b) ERP systems track business resources like cash, raw materials, production capacity like and the status of business commitments: orders, purchase orders, and payroll.

ERP systems typically include the following characteristics:

- An integrated system
- Operates in (or near) real time
- A common database that supports all the applications
- A consistent look and feel across modules
- Installation of the system with elaborate application/data integration by the Information Technology (IT) department, provided the implementation is not done in small steps
- Deployment options include: on-premises, cloud hosted, or SaaS
- ERP systems connect to real–time data and transaction data in a variety of ways. These systems are typically configured by systems integrators, who bring unique knowledge on process, equipment, and vendor solutions.
- Direct integration—ERP systems have connectivity (communications to plant floor equipment) as part of their product offering. This requires that the vendors offer specific support for the plant floor equipment their customers operate. ERP vendors must be experts in their own products and connectivity to other vendor products, including those of their competitors.
- Database integration—ERP systems connect to plant floor data sources through staging tables in a database. Plant floor systems deposit the necessary information into the database. The ERP system reads the information in the table. The benefit of staging is that ERP vendors do not need to master the complexities of equipment integration. Connectivity becomes the responsibility of the systems integrator.
- Enterprise appliance transaction modules (EATM)—These devices communicate directly with plant floor equipment and with the ERP system via methods supported by the ERP system. EATM can employ a staging table, web services, or system specific program interfaces. An EATM offers the benefit of being an off the shelf solution.
- Custom–integration solutions—Many system integrators offer custom solutions. These systems tend to have the highest level of initial integration cost, and can have a higher long term maintenance and reliability costs. Long term costs can be minimized through careful system testing and thorough documentation. Custom integrated solutions typically run on workstation or server class computers.

ERP provides an integrated view of core business processes, often in real-time, using common databases maintained by a database management system. ERP systems track business resources like cash, raw materials, production capacity and the status of business commitments: orders,

purchase orders, and payroll. ERP systems are considered as the backbone of many big enterprises in the world aimed at conducting the business processes of an enterprise more effectively and efficiently in an integrated manner.

1.1 ERP System and Organization

It is by and large a deceptive observation that executing an ERP framework will enhance associations' functionalities medium-term. The elevated standard of accomplishing all-round cost reserve funds and administration enhancements is particularly subject to how great the picked ERP framework fits to the hierarchical functionalities and how well the fitting and setup procedure of the framework coordinated with the business culture, methodology and structure of the association. In general an ERP framework is required to enhance both spine and front-end works all the while. Associations pick and convey ERP frameworks for some substantial and elusive advantages and key reasons. Much of the time the estimation of quantifiable profit (ROI) is weighted against the numerous immaterial and vital advantages.

1.2 Software-As-A-Service (SaaS)

It is a software licensing and delivery model in which software is licensed on a subscription basis and is centrally hosted. It is sometimes referred to as "on-demand software", and was formerly referred to as "software plus services" by Microsoft. SaaS is typically accessed by users using a thin client, e.g. via a web browser. SaaS has become a common delivery model for many business applications including office software, messaging software, payroll processing software, DBMS software, management software, CAD software, development software, gamification, virtualization, accounting, collaboration, customer relationship management (CRM), Management Information Systems (MIS), enterprise resource planning (ERP), invoicing, human resource management (HRM), talent acquisition, learning management systems, content management (CM), Geographic Information Systems (GIS), and service desk management. SaaS has been incorporated into the strategy of nearly all leading enterprise software companies. SaaS applications are also known as Web-based software, on-demand software and hosted software.

Centralized hosting of business applications dates back to the 1960s. Starting in that decade, IBM and other mainframe providers conducted a service bureau business, often referred to as time-sharing or utility computing. Such services included offering computing power and database storage to banks and other large organizations from their worldwide data centers.

The expansion of the Internet during the 1990s brought about a new class of centralized computing, called Application Service Providers (ASP). ASPs provided businesses with the service of hosting and managing specialized business applications, with the goal of reducing costs through central administration and through the solution provider's specialization in a particular business application Software as a Service essentially extends the idea of the ASP model. The term *Software as a Service (SaaS)*, however, is commonly used in more specific settings:

- While most initial ASP's focused on managing and hosting third-party independent software vendors' software, as of 2012 SaaS vendors typically develop and manage their own software.

- Whereas many initial ASPs offered more traditional client-server applications, which require installation of software on users' personal computers, SaaS solutions of today rely predominantly on the Web and only require a web browser to use.

1.2.1 Pricing

Unlike traditional software, which is conventionally sold as a perpetual license with an up-front cost (and an optional ongoing support fee), SaaS providers generally price applications using a subscription fee, most commonly a monthly fee or an annual fee. Consequently, the initial setup cost for SaaS is typically lower than the equivalent enterprise software. SaaS vendors typically price their applications based on some usage parameters, such as the number of users using the application. However, because in a SaaS environment customers' data reside with the SaaS vendor, opportunities also exist to charge per transaction, event, or other unit of value, such as the number of processors required.

The relatively low cost for user provisioning (i.e., setting up a new customer) in a multitenant environment enables some SaaS vendors to offer applications using the free mium model. In this model, a free service is made available with limited functionality or scope, and fees are charged for enhanced functionality or larger scope.

A key driver of SaaS growth is SaaS vendors' ability to provide a price that is competitive with on-premises software. This is consistent with the traditional rationale for outsourcing IT systems, which involves applying economies of scale to application operation, i.e., an outside service provider may be able to offer better, cheaper, more reliable applications.

1.2.2 Architecture

The vast majority of SaaS solutions are based on a multitenant architecture. There are two main varieties of SaaS:

a) Vertical SaaS: Software which answers the needs of a specific industry (e.g., software for the healthcare, agriculture, real estate, finance industries).

b) Horizontal SaaS: The products which focus on a software category (marketing, sales, developer tools, HR) but are industry agnostic.

It facilitated applications which can be utilized in the undertaking asset arranging frameworks and it will be extremely helpful in these applications. SaaS can be formed for adjusting for the implantation in the product applications like ERP frameworks. Also, it is OK with the change the manner in which associations makes installment for administrations, actualize, and run their product applications.

2. LITERATURE SURVEY

The Gartner Group first used the abbreviation ERP in the 1990sto include the capabilities of material requirements planning (MRP), and the later manufacturing resource planning (MRP II), as well as computer-integrated manufacturing. Without replacing these terms, ERP came to represent a larger whole that reflected the evolution of application integration beyond manufacturing.

Not all ERP packages developed from a manufacturing core; ERP vendors variously began assembling their packages with finance-and-accounting, maintenance, and human-resource

components. By the mid-1990s ERP systems addressed all core enterprise functions. Governments and non–profit organizations also began to use ERP systems.

2.1 Cloud Computing

Marston et al. (2010) describe that the evolution of cloud computing over the past few years is potentially one of the significant milestones in the history of computing. Cloud computing has made radical changes in the way information technology services are invented, developed, deployed, scaled, updated, maintained and paid for. The basic promise of cloud computing is to deliver all the functionalities of information technology, even those have been considered infeasible hitherto, in a way that reduce upfront cost of computing which avoid many businesses to deploy cutting edges of IT services. To put it simply, cloud computing helps to converge two major trends of IT efficiency and business agility in information technology. According to the **Gartner Research(2012)**, cloud computing is expected to become a 150$ billion business by 2014 and AMI partners expect that small to medium sized enterprises (SMEs) spend over 100$ billion on cloud computing by 2014. In cloud computing architecture, cloud services are typically defined in three categories of (a) IaaS: Infrastructure as a service (b) PaaS: Platform as a service , and (c) SaaS: Software as a service which among all, SaaS is the most common type of cloud services while it is heralded to be a serious alternative for on-premise software . In SaaS, users do not need to install any software on client computers while getting the software service from the applications run on the cloud.

Kelly M.(2012)in their study investigated that Cloud-based applications offer several significant advantages: elimination of capital costs, faster deployment and productivity, streamlines use and management, increases flexibility and improves customer service. The elimination of capital costs is possible because the business accesses the applications through a web interface over the internet and does not require the purchase of any additional infrastructure, such as servers, backup, operating systems, databases, facility space, etc. A company can simply plug and play. Choosing a cloud provider allows each business enterprise to take advantage of the economies of scale realized by pooling the resources of the provider and all of its customers.

According to **Gartner (2012),** "Software as a service (SaaS) SCM offerings showed above-market growth (13 percent in 2012)" while SCM in general only grew 7.1%. (Gartner Says Worldwide Supply Chain Management Software Market Grew 7.1 Percent to Reach $8.3 Billion in 2012)

2.2 Cloud Transparency and Data Privacy

According to **(Pearson, S., 2009).** The interviewees confirmed that such lack of transparency and control is a typical phenomenon in the cloud environment and can often raise concerns related to data privacy. In particular, the interviewees highlighted that client companies may often worry about where their enterprise data will be physically stored by cloud vendors and whether the privacy of these sensitive data will be fully protected. A further review of the literature reinforced that due to technical and costing reasons, data stored in the cloud may often be moved by cloud providers between different servers located in different countries and geographical locations, without informing the client companies**. Armbrust, M. et al.(2010)**discuss that European customers adopting cloud services provided by US vendors are often concerned about the U.S Patriot Act, which empowers the US government to access any data without obtaining consent of

the data owner**. Dutta, A. et al. (2013)** says that the advanced cloud computing model enables cloud ERP providers to separate enterprise data from internal hardware and servers of user companies. This inherent feature of cloud computing however also determine that IT operation within a third-party cloud provider will be by no means transparent to user companies, who also have limited control on the subscribed cloud services**.** However, different and inconsistent data protection laws may be applied in different countries, and can thus increase the possibility for data privacy to be jeopardized**.** Consequently, the interview findings suggest that these transparency and data privacy concerns are currently preventing many companies from adopting cloud technologies in general and cloud ERPs in particular.

2.3 Data Security

According to **Peng, G.C. et al. (2009)**. The terms 'data privacy' and 'data security' are often used concurrently and even interchangeably. However, we would argue that these two related concepts are indeed different in nature. In particular, data privacy refers to the right of client companies to be sure that their confidential data kept by service providers is controlled and used properly (e.g. not to be disclosed to any unauthorized individuals and/or organizations). On the other hand, data security relates to the practice of the protection of data against unauthorized access, disclosure and use. It should be pointed out that poor security practices will inevitably lead to poor data privacy. However, data privacy can also be jeopardized by other non-security reasons (e.g. inconsistent data protection laws used in different countries, as discussed above). It is frequently mentioned in the industry that cloud vendors can provide a better IT infrastructure to protect data security. However, a review of the literature suggested that data leakage and loss are more likely to be caused by human reasons in practice, rather than by technology failure. In particular, the integrated nature of ERP determines that data stored in the system can be shared and used across different departments of the organization. Managers can thus often access the data of not only their own department but also other business areas. With traditional ERPs, managers may often keep multiple copies of these important enterprise data on their staff PCs, laptops, disks, and memory sticks. However, if any of these hardware equipment is lost or stolen, there is a high risk for the data stored inside to be disclosed to unauthorized people. Alternatively, there may also be a possibility for internal staff to download sensitive enterprise data from the system and give it to business competitors to exchange higher return. A number of interviewees confirmed that these typical data security risks can also occur when using cloud ERPs. Moreover, when ERP data are hosted by a third-party cloud provider, companies will have even less control on whom (from the vendor side) may access and download their crucial enterprise and customer data. Such lack of control in the cloud environment will inevitably introduce further data security threats to client companies. A Senior Cloud Consultant interviewed confirmed that such data security risks may be more likely to occur with cloud vendors that are "smaller in size, using inefficient data protection and monitoring practices, and having higher staff turnover".

2.4 Customization and Integration with Existing ERP or Legecy Applications inside a Corporate Firewall

Kimberling E.(2013) argues customization to be one of the most controversial topics surrounding ERP software. According to his report only 23 percent of organizations implement plain vanilla ERP software with little or no customization. Following table shows average rate of ERP customization for four well known ERP providers.

	Heavy	Moderate	Vanilla
SAP	38,40%	40,60%	21,00%
Oracle EBS	34,40%	40,00%	25,60%
Microsoft Dynamics	32,80%	42,20%	25,00%
Tier II ERP	23,50%	48,10%	28,40%

This report clearly shows that customization of ERP systems is common and important feature. The data presented in this report refers to traditional ERP systems.

2.5 The lack of Customization Ability in Cloud ERP System

Jia S.(2009) claims ERP systems delivered as SaaS do not provide enough ability to develop customization, and therefore present a challenge for customers with more demanding requirements Cloud ERP vendors tend to utilize economy of scale by offering standardized solution to reach larger number of potential customers**. Bezemer C.P.(2010)**arises an issue when customers expect Cloud ERP systems to be tailored according to their specific needs, providing the same level of customization as on-premise ERP solutions. There are valid concerns that Cloud ERP systems provide less flexibility and customization options then traditional ones**.** According to **Schubert et al. (2011),** SaaS is only suited for software "out of the box", that does not require much customization or integration with other applications **Saeed I. et al.(2012)** argue customization to be difficult in Cloud ERP systems, and consider it a technical barrier to Cloud ERP adoption. Such system is not under customer's control as they do not own, but only rent it. Also ERP system is deployed in cloud environment, which is much stricter than on-premise proprietary environment. However, same authors note that there is a discrepancy in this matter between ERP vendors' claims and academic reports, which needs to be further clarified. **MuhlemanR. et al.(2012)** in their paper discuss motives to adopt cloud enterprise solutions, and they give an advantage to in-house solutions in case of dealing with larger companies. As one of the reasons they state that in-house ERP solutions have increased customization ability, while with cloud-based SaaS solutions this is typically limited to the vendor. **Bibi S.et al.(2012)** performed a SWOT analysis for migrating business software to cloud, and positioned limited customizability and limited configurability as weaknesses. They stated that on-premise software development focuses on customization as a means to market innovations, whereas cloud-based development restricts it to keep the total costs of operations low.

2.6 Integration with Existing ERP or Legacy Applications

According to **Schubert et al.(2011)**, SaaS is only suited for software "out of the box", that does not require much customization or integration with other applications. They explained that generally, most of companies have different ERP systems. Outsourcing services to a partner with different ERP system will require an enormous work of ERP systems integration. Sending and receiving

data from a partner who will take care of specific outsourced services will necessitate data transformation in order that the ERP systems communicate with each other. He clarified that making a purchasing order, delivery order and sending an invoice are already three tasks that will require days of work.

ERP systems integrations have to be taken in consideration; it will require great work to transform data to be compatible with all different ERP systems. Therefore before outsourcing services, companies are recommended to select the right cloud ERP that will be compatible with their partners ERP systems. It would be easy if the partners create alliances that use same ERP system that allows them to avoid the burden of ERP system integration that might consume a considerable time and human resources. The applications that make up the system share data across various departments (manufacturing, purchasing, sales, accounting, etc.) that provide the data.

3. CONCLUSION

This work proposes a framework for assessing the sustainability of ERP as SaaS. Main barriers to technology adoption in SMEs are Lack of suitable products, Lack of affordable solutions, Lack of knowledge, Lack of skilled professionals and the high cost of maintenance. Another major problem they are experiencing is the steep learning curve in using IT products. Software as a Service (SaaS) is increasing expanding acknowledgment and is subsequently changing how Enterprise Resource Planning (ERP) frameworks are conveyed and devoured. The current writing demonstrates that there is an absence of observational research about SaaS and ERP frameworks. From inquire about point of view, this exploratory research has made a first endeavor. To the best of our insight, there is the principal methodological grounded look into that considered which offers can be offered by SaaS from a merchant's perspective.

The general end is that the motivations to utilize ERP don't change no make a difference if the product is introduced on premise or devoured on-request. The greater part of the incentives simply impact the method for utilizing ERP in a more productive, adaptable and basic way. Additionally as the essential part ERP framework plays in firms today makes it hard to hand control over to outsiders. One can reason that the degree to which an application is seen as being center to the business tasks negatively affects the appropriation of SaaS, and subsequently ERP in SaaS.

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