Is It Now the Right Time to Migrate Enterprise Systems to the Cloud?

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INTRODUCTION

Ever since its emergence in the early 1990s, Enterprise Resources Planning (ERP) systems have been widely implemented by thousands of knowledge-intensive organisations, with any size (e.g. including not just large companies, but also small and medium enterprises or SMEs), in many sectors (e.g. manufacturing firms, banks, universities, and hospitals), and in many countries (e.g. Western countries like the USA and Europe as well as Asian countries like China and India). Traditionally, ERP resources (including data, module applications, and database servers) are internally hosted and maintained by user organisations. However, and accompanied with the development and emergence of cloud computing technologies in the late 2000s, there is an increasing trend for companies to migrate their hitherto internal ERP applications and databases into the cloud. Such ERP resources re-migration can potentially bring a wide range of benefits to user companies, e.g. increased operational efficiency and productivity, reduced hardware investments, and less system maintenance fees (Dutta et al., 2013; Marston et al., 2011). Nonetheless, and despite these attractive benefits, migrating critical ERP applications and data to the cloud is also associated with a wide range of barriers, challenges and risks (Dutta et al., 2013). For instance, the inherent features of cloud computing determine that ERP 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. Such lack of transparency and control may raise potential threats related to the security and privacy of business and customer data stored in the cloud (Voorsluys et al., 2011). Moreover, user companies need to make a range of internal changes (e.g. designing new business processes, refining IT roles, and downsizing IT department) to prepare themselves to the new ERP environment in the cloud (Ali, 2010). These changes however may potentially lead to job dissatisfaction of in-house IT and business staff (Dutta et al., 2013). As an emerging topic in the IT industry, current studies on cloud-based ERP are very limited. Furthermore, the benefits of cloud technologies in general and cloud ERP in particular seem to be often mentioned by cloud providers, whilst potential barriers and difficulties related to this new ERP deployment method have not been fully explored and discussed in either the industry or the academia. This article therefore aims to fill this knowledge gap by providing a critical and up-to-date account on potential benefits and barriers for migrating ERP systems to the cloud. It provides useful insights and a more holistic view to help companies better prepare themselves for such crucial ERP and IT transformation.

BACKGROUND: FROM ON-PREMISE TO CLOUD-BASED ERP

ERP systems can be defined as an enterprise-wide information system package, which consists of a comprehensive set of software modules that aim to support and integrate all key business processes across various functional divisions (e.g. sales, production, purchasing, accounting, and human resource) of an organisation by using a single data repository (Peng & Nunes, 2012).

Conventionally, ERP systems are installed and hosted internally by user companies in their own servers (this is so called on-premise ERPs). This on-premise approach, which is still prevalently adopted by modern organisations to host and deploy their ERP systems, however has some inherent disadvantages (Mangiuc, 2011). In particular, an on-premise ERP will generally require user companies to invest substantial financial and human resources to purchase, install, maintain and improve the software package and related IT facilities (e.g. servers, hardware, and any necessary

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facilities to run it) (Mangiuc, 2011). When companies (especially large and multi-national companies) have a high number of ERP users, installing and constantly upgrading the software package on the PC of each user will be very costly and time consuming. These disadvantages embedded in on-premise ERPs are expected to be significantly improved with the support of cloud computing technologies.

Cloud computing is an advanced IT model to host and share both software and hardware resources over the Internet. It allows organisations to use a pool of IT resources and applications as services virtually through the web, without physically holding these computing resources internally (Dutta et al., 2013; Voorsluys et al., 2011). Cloud computing has been widely perceived as one of the most important development in the IT industry in the late 2000s. In particular, from 2008 to 2010 Gartner (a well-known global IT consulting firm) had constantly rated cloud computing as one of the top 10 strategic technologies, which has the potential to change traditional IT usage in organisations and even transform the global IT industry (Pettey, 2011). A wide range of cloud computing services are currently available in the market, and can be divided into three main categories/models (Voorsluys et al., 2011):

- **Software as a Service (SaaS):** In the SaaS model, software applications are run on a vendor-managed and controlled infrastructure, and are made available to clients through web browsers.
- **Platform as a Service (PaaS):** In the PaaS model, computing platforms are provided as a service to deploy and run user applications. It offers a programmable environment and middleware to support IT application development and deployment in user companies.
- **Infrastructure as a Service (IaaS):** In the IaaS model, hardware and IT infrastructure resources (e.g. CPUs, hard discs, databases, and servers) are provided as a service to companies through the virtualised cloud environment.

It is obvious that cloud ERP is closely related to the SaaS deployment model. By using the SaaS model, a third-party cloud vendor can provide companies a virtualised platform to host their ERP package and related data. Companies can use their ERP applications and data as on-demand services through a web browser, without physically installing the system in local PCs or storing the data in local servers. Many of the world's leading ERP vendors (e.g. SAP and Oracle) have started applying this advanced IT model to deploy and host their traditionally on-premise ERP packages. Such cloud ERP is expected to deliver a range of attractive benefits to user companies, as discussed below.

BENEFITS ASSOCIATED WITH CLOUD-BASED ERP

When advanced cloud technologies are used to deploy ERP systems, user companies can expect to receive a range of benefits that they cannot generally obtain from traditional on-premise ERPs. This section provides a critical discussion and overview on some of the most important advantages of cloud ERPs, in comparison with traditional ERP solutions.

Substantial Decrease of ERP Cost

The high implementation and maintenance cost has been one of the most crucial factors preventing companies (especially SMEs) from adopting on-premise ERP systems (Peng and Nunes, 2010). In particular, and as discussed above, the implementation of on-premise ERPs usually requires a large initial investment to purchase the software and related IT infrastructure facilities (e.g. hardware and servers). Ongoing investments (including both human and financial resources) will also need to be made to maintain and upgrade constantly the software package and related hardware facilities during the ERP post-implementation stage. If the company does not currently have enough internal IT personnel to handle these ERP deployment tasks, additional resources will need to be spent on recruiting new IT experts and/or providing further training to current staff.

Such typical costing issues associated with on-premise ERPs can be significantly improved by adopting cloud solutions. As discussed above, cloud providers will host all necessary IT/ERP infrastructure facilities for user companies, who will no longer need to purchase and keep these IT resources internally (Dutta et al., 2013). The initial cost of ERP implementation can

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