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ABSTRACT

With increasing market competition and globalization, SMEs have shown interest to deploy ERP package to integrate their business processes. High investment in terms of cost, manpower and time are the major hurdles while selecting a traditional ERP package. Hence there is a need to look for a cost effective ERP solution. Deploying ERP on Cloud is one such option due to lower infrastructure cost and flexible payment. A SME evaluates an ERP solution from Economical, Technological and People perspectives with the factors that measure them. . . A factor can either be a benefit or a threat. A benefit facilitates whereas a threat holds back SMEs decision to adopt ERP in cloud. This research provides a benefit- threat framework on Economical, Technological and People perspective that a SME perceives while selecting ERP in cloud environment. The framework is validated and it suggests that Economical and Technological are two important perspectives while selection of ERP on cloud for a SME.

INTRODUCTION

In recent past, the business environment in which companies operated has undergone profound changes. Earlier companies competed in market place on basis of performance objectives like price or quality. However, market now demands customer satisfaction and service flexibility along with competitive price and quality (Yusuf et al., 2004). To meet these challenges, organizations are employing various measures such as improved processes, better supply chain management, automation, better customer service and deployment of information technology systems such as Enterprise Resource Planning (ERP). ERP is a comprehensive packaged software solution that integrates organizational processes like sales, finance, purchase, inventory management etc through shared information and data flows (Rosemann, 2001). The information/data flow and its integration results in complexity of an ERP package (Negi, 2009). It is generic in nature and need to be configured for specific organization, industry sector, and country.

Current industry demand to implement ERP system is fast growing (Ho et al., 2004) despite the fact that ERP projects are the largest information technology projects in terms of project investment worldwide (Gattiker, 2005). Most of the large organizations in India like ONGC, Goodlass Nerolac, Tata Motors, Cadbury India, Sony, Siemens etc. have invested huge in ERP implementation (Mahara, 2013). With the saturation in ERP market for large organizations (Deep, 2008) and the fact that 95% of industrial units in India comprises of Small and Medium enterprises (SMEs), focus of leading ERP vendors has shifted to capture the SME market (Saini, 2012). For example, SAP, has launched All-In-One package for Asia –Pacific SMEs (Sharma 2007). The ERP market for SME is projected to be Rs. 728 crore ($160 million), 47% of the overall market (Munjal, 2006) of Rs. 1,550 crore ($341 million) as per the study conducted by IDC. The SMEs have also started to show deep interest in ERP implementation as this will

standardize their business processes and integrate the data. This would help them in taking timely decisions by reducing the turn overtime. Also it will provide them the competitive advantage over their competitors (Sharma, 2010; Kale, 2010).

Even though SMEs want to aggressively adopt ERP to efficiently manage their business, high software and license fees, and implementation complexity has created some resistance for traditional ERP packages (Davenport, 1998; Hadara, 2011). To add to this, lack of IT infrastructure and people to support implementation along with reduced IT spending by organizations due to slowing down of economies (Hofmann, 2008) has further strengthened their view of not opting for traditional ERP packages. With all these limitations, they still need to find a solution to implement ERP to keep them sustained in the global market.

The alternate solution under consideration should be cost effective as compared to the traditional ERP solution. Cloud based ERP is one such technology that allows organizations, users or individuals to access and use ERP software installed on vendors site through internet access on demand (Saini, 2012). The main reasons to consider this option are the low entry cost, as no initial investment is required to set up IT infrastructure and pay-per-use model.

This paper explores the option of ERP on cloud by finding out various factors that needs to be addressed while selecting ERP for SMEs. The study has been done by selecting 30 SMES in India and for this study; the Government of India definition of SMEs has been used (Sharma 2007). According to this definition, small enterprises are those that have an investment of not more than Rs. 50 million (approximately 0.6 million pounds) in plant and machinery (Ministry of Small-Scale Industries, 2004).

CLOUD COMPUTING AND ERP – AN OVERVIEW

Cloud Computing is a technological platform that allows users, organizations or individuals, to access and use computer resources via the internet on demand independent of device and location (Schubert, 2011; Marston, 2011). Three services namely SaaS (Software as a Service), IaaS (Infrastructure as a Service) and PaaS (Platform as a Service) are provided by different clouds in public domain. In the SaaS model, the cloud provides software to the users. Many customers use the same software in their own private data space. Users are not required to install any application on their PCs to access the software services provided by the cloud. They can use the software utility but have no rights to control or manage the infrastructure. The minimum requirement to access cloud services are internet connection with a PC. For IaaS model, the cloud provides capability to the users to use various computing resources, instead of buying them. The users have right to control the storage, operating system and deployed applications. The services are billed for their usage. In case of PaaS, cloud provides platform to build user applications and software. Deployed application can be accessed from anywhere and the space for these applications can be increased and decreased based on the usage. The users have rights to control their deployed application and several application hosting environment configurations. SaaS service model is best suited for selection of ERP software on cloud platform. In this model the ERP software is deployed on the vendor's server. This will not involve upfront IT hardware and software investment. No hefty license fees needs to be paid as the main advantage of SaaS is pay-per-use. The PaaS model is not applicable as the organization is not involved in coding and testing of the ERP software. Regarding the IaaS model the only infrastructure required by SMEs

to use this software would be the internet connection with good bandwidth and hence this model is also not evaluated for the study.

Economical, Technological and People perspectives are important when a SME decides to go ahead for ERP software in the cloud environment. The next section discusses these perspectives along with their factors that play important role in evaluating the software.

FACTORS AFFECTING SELECTION OF ERP IN CLOUD

Economical, Technological and People are the three perspectives a SME has to analyze the ERP software on cloud (Mahara, 2013). The economical perspective deals about financial issues, technological perspective involves technical evaluation of the software and the people perspective is concerned with the effect that selection and adoption of ERP will have on the people within the organization. There are factors that contribute to these perspectives and in this section these factors are discussed. (Hatwar, 2013, Makkar, 2012; Saini, 2012; Marston, 2011; Motalab, 2011; Hadidi, 2010, 2011; Hosseini, 2011; Sohag, 2011; Djohnson, 2010; Koehler, 2010; Hofmann, 2010; Clarke, 2010; Mozafari, 2012; Rassule, 2010).

    a. **Flexible Payment (FP):** The charges are determined by actual use of the ERP software rather than by fixed license fees as charged by the traditional ERP vendors. Prices are very competitive. This is one of the major advantages of moving to the cloud.

    b. **Reduced IT Infrastructure Cost (RITC):** There is no need to invest upfront in hardware, software or any other IT infrastructure as the virtual services are on a remote server and only a login through internet is needed to access the ERP software.

    c. **Low Operational Cost (LOC):** The cost to maintain and run the ERP software reduces.

    d. **Low IT Manpower (LITM)**: The IT manpower needed to maintain the ERP software goes down as it is the task of the vendor to manage the required infrastructure.

    e. **Data backup and Recovery (DBR):** It deals with issues of how and where the organization data would be stored in the ERP database. There should be assured backup of data and in case of data loss or tampering, efficient recovery should be possible.

    f. **Ubiquitous access (UA):** The users should be able to access the ERP software on the cloud without any delay and technical difficulties.

    g. Loss of key staff members. The people in an organization might not be clear about their position and roles when ERP selection and deployment is done and hence might decide to quit the organization.

    h. **Scalability on demand (SD):** The no of modules and users for the ERP software on the cloud can be scaled depending upon the organizations usage.

    i. **Vendor Reliability (VR):** Many vendors are coming up with ERP on cloud environment. The major concern for the organization opting for ERP solutions is the credentials of these vendors.

    j. **User friendly (UF):** The functionalities of the ERP software on the cloud should be easy to use.

    k. **Customization (CUS):** Certain level of customization should be supported by the software.

    l. **Availability (24X7):** This is commonly used to refer to the readiness and accessibility. The services should be available on demand and 24X7 on the Internet.

m. **Resistance to change:** There is change in work methodology and structure and people in the organization might resist these changes.

n. **Platform Independence (PI):** The ERP software can be accessed at any location and compatible to the digital devices.

o. **Data Security (DS):** The data should not be accessed by unauthorized persons on the network and within an organization. The public perception of lack of security is a major threat to adoption of ERP in cloud.

p. **Interoperability:** This issue arises when the ERP software and its services are required to be moved from one cloud to another.

q. **Service Survival**: It is the situation when the vendor might collapse or stop providing services.

r. **Perceived lack of control**. The people in an organization might feel that they have lost authority to manage the processes. Also there is a perception that they have no control over the various resources that are on cloud.

The factors listed above are needed to be considered while considering ERP package on cloud for SME. These factors can either be benefits or threats for a specific organization perspective as depicted in Table 1.

Table 1: SME Perspective to be considered while adoption of ERP in cloud.

SME Perspective	Benefits	Threats
Economical	Flexible Payment	
	Low Operational Cost	
	Reduced IT Infrastructure Cost	
	Low IT Manpower	
Technological	Scalability on demand	Vendor Reliability
	User friendly	Service Survival
	Platform Independence	Data backup and Recovery (DBR)
	Customization	Interoperability
		Availability
		Ubiquitous access
		Data Security
People		Perceived lack of control
		Resistance to change
		Loss of Key Staff

RESEARCH OBJECTIVES

Following are the research objectives:

- To find out the most important benefits and threats that SME perceives while evaluating ERP in Cloud.

- To find out the most important SME perspectives while evaluating ERP in cloud.

Following hypotheses are formulated to find out the most important SME perspective (economical, technological, people) while selection of ERP on cloud.

> **H1**: Economical perspective is the most important benefit while evaluating ERP on cloud.
>
> **H2:** Technological perspective is the most important benefit while evaluating ERP on cloud.
>
> **H3**: People Perspective is the most important threat while evaluating ERP on cloud.
>
> **H4**: Technological perspective is the most important threat while evaluating ERP on cloud.

DATA COLLECTION AND ANALYSIS

The primary data was collected from 30 SMEs by interacting with the top management and IT personnel, followed by getting responses to the questionnaire. Many organizations did not have an IT staff; in such cases the answers were obtained from the top management. Figure 1 and 2 depicts the mean of various benefits and threats that an SME perceives while evaluating ERP on Cloud.

**Figure 1: Mean of factors leading to benefits of ERP on cloud.**
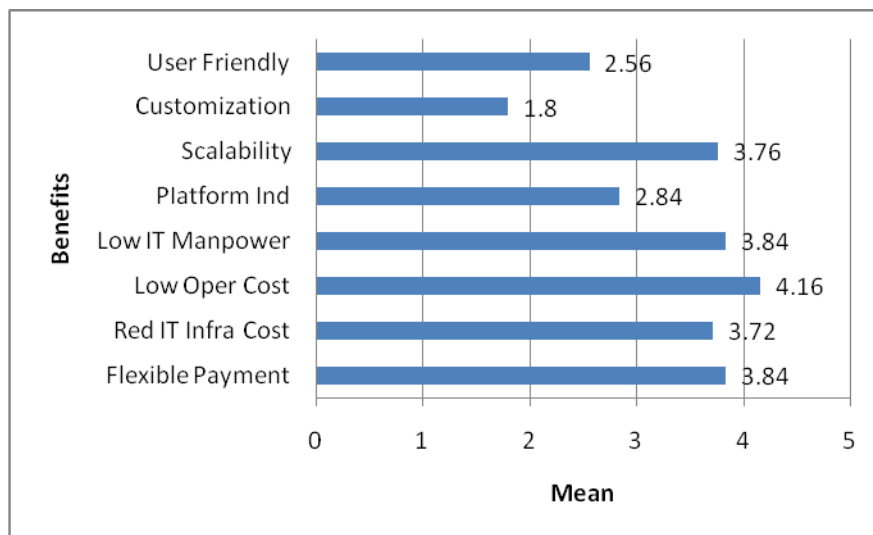
SMEs have limited budget and manpower and if an ERP solution allows them to stream line their processes at low operational cost they would be eager to adopt such a solution. Hence benefits of reduce cost and low manpower requirement are perceived as important benefits by SME. Scalability is also another important benefit that they perceive depending upon the software usage and the number of persons using the software. The main idea to deploy ERP by a SME is to gain operational efficiency. To achieve this, they do not feel a need to customize the software and make it user friendly. The people in the organization can be trained to use the software.

For an SME the biggest threat while considering the option of ERP on cloud is with respect to data security, its backup and recovery. They have questions like "Is my data safe?", "What if someone accesses the data?", "What will happen if the server crashes?". All this factors needs to

be addressed with due. Vendor reliability is another threat and it can be addressed by doing the market survey to check vendor credentials. In a SME, the number of employees is less and thus people related issues are not considered an important threat.

Figure 2: Mean of factors leading to threats of ERP on cloud.
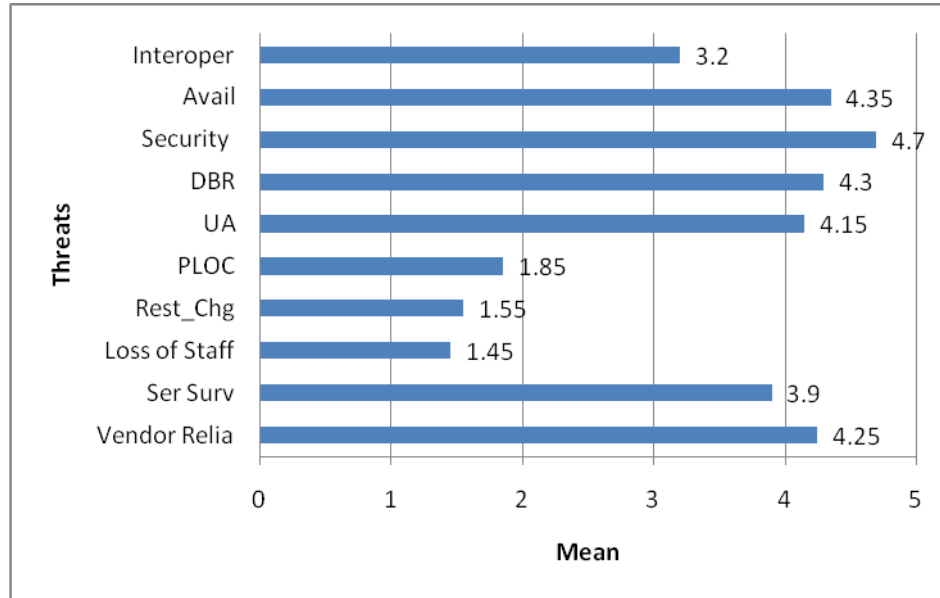
Hypotheses H1, H2, H3 and H4 formulated to find out SMEs perspective for selection of ERP in cloud are validated using one-tailed sample t-test. These hypotheses are tested by verifying whether the scores the respondents assigned to the organization perspectives were significantly better than the middle score on the Likert scale for an item (Condori- Fernandez, 2006). Initially, the scores of each subject were averaged over the different items that are relevant for a perspective. Three mean values were obtained for each subject for each perspective. One-tailed sample t-test checks the difference between the mean of each perspective and the value 3 (middle score). The statistical test was applied with a significance level of 5% (alpha=0.05).

Table 2: t-test results.

Statistics	Economical benefit (H1)	Technological Benefit(H2)	People Threat (H3)	Technological threat (H4)
Mean difference	0.95	2.74	0.19	1.12
95% conf. Interval for the diff	0.7231(lower)	-0.5011(lower)	-1.474(lower)	0.904 (lower)
	1.17 (upper)	-0.0189(upper)	-1.291(upper)	1.3386 (upper)
Observed t value	8.642	-2.226	-31.61	10.806

The results of the t-test as shown in table 2 allow us to accept the hypotheses H1 and H4 and reject the hypotheses H2 and H3. According to hypothesis H1 and H4, SME perceives economical benefit as most important while going for ERP on cloud and it has technological threats as the major concern. These threats can be addressed by mitigation measures given in the SLA signed between the SME and the ERP vendor. Table 3 summarizes the findings.

Table 3: Findings.

SME Perspective	Benefits	Threats
Economic	Most Important to perceive ERP	None
Technological	Scalability and Platform Independence are important for SMES to go for ERP on cloud.	Most Important and needs to be addressed with due diligence, while selecting ERP solution in cloud.
People	None	Not Important

CONCLUSION

The main objective of t the study is to provide a framework to find possible benefits and threats based on the three enterprise perspectives (Economical, Technological and People) that a SME has while evaluating an ERP solution on Cloud in Indian SMEs. The results indicate that economical perspective is the major benefit that SME perceive for adoption of ERP in cloud whereas the major threat is the technological issues like data backup, security, availability etc. People related threats are not considered important by a SME as the number of employees working and using ERP software are less . This framework can be used by other SMEs to find out important benefits and threats that they perceive while evaluating options of ERP on cloud.

REFERENCES

Clarke, R. (2010). Computing Clouds on the Horizon? Benefits and Risks from the User's Perspective, 23rd Bled eConference Etrust: Implications for the Individual, Enterprises and Society, June 20-23, Bled, Slovenia.

Condori-Fernandez, N., & Pastor, O. (2006). An Empirical Study on the Likelihood of Adoption in Practice of a Size Measurement Procedure for Requirements Specification, Proceedings of the 6th International Conference on Quality Software, 133-140.

Davenport, T. H., (1998). Putting the enterprise into the enterprise system, *Harvard Business Review*, 76(4), 121-133.

Deep, A., Guttridge, P., Dani, S., & Burns, N. (2008). Investigating factors affecting ERP selection in made-to-order SME sector. *Journal of Manufacturing Technology Management*, 19(4), 430-446.

Fui-Hoon, Nah., Lau, S., & Kuang, J. (2001) Critical Factors for Successful Implementation of Enterprise Systems. *Business Process Management Journal, 7*(3), 285-296.

Gattiker, T. F., & Goodhue, D. (2005). What happens after ERP implementation: understanding the impact of interdependence and differentiation on plant-level outcomes, *MIS Quarterly*, 29(3), 559-585.

Geelan, J. (2011). Twenty one experts define cloud computing. Virtualization. *Electronic Magazine*,   http://virtualization.sys-con.com/node/612375, viewed on 20th April 2011.

Haddara, M. (2011). ERP Cost Factors in SMEs, *European, Mediterranean & Middle Eastern Conference on Information Systems 2011.*

Ho, C-Fu., Wu, W-H., & Tai, Y-M. (2004). Strategies for the adaptation of ERP systems. *Industrial Management & Data Systems*, 104(3), 234-251.

Hofmann, P. (2008). ERP is Dead, Long Live ERP, *IEEE Internet Computing,* 12(4), 80-84

Hofmann, P. (2010). Cloud Computing: The Limits of Public Clouds for Business Applications. *Internet Computing,* 14(6), 90-93.

Hadidi, R. (2011). What Managers of Small and Medium Enterprises (SMEs) Need to Know about Cloud Computing and Services. *European Journal of Management*, 11(4), 79-87.

Hadidi, R. (2010). Exploring the use of SWOT Analysis in the Adoption of Cloud Computing Services for Small and Medium-sized Enterprises (SMEs). *European Journal of Management*, 10(3), 109-116.

Hatwar, P., Sen, S., & Negi. T. (2013). Estimation of Service Quality Dimensions in Cloud Computing Environment, 10th AIMS International Conference on Management, IIM Bangalore, January 6-9.

Hosseini, A, K., Sommerville, I., Bogaerts, J., & Teregowda, P. (2011). Decision Support Tools for Cloud Migration in the Enterprise, IEEE Cloud,   541-548.

Johnson, D. (2010). ERP for Distributors: SaaS versus Traditional, Accessed on 24th August, 2012, http://erpcloudnews.com/2010/04/erp-for-distributors-saas-versus-traditional/.

Kale, T., Banwait. S., & Laroiya, C. (2010). Performance evaluation of ERP implementation in Indian SMEs, Journal of Manufacturing Technology Management, 6(21), pp.758 – 780.

Koehler, P., & Anandasivam, A. (2010). Cloud Services from a Consumer Perspective, Proceedings of the 16th Americas Conference on Information Systems (AMCIS), Lima, Peru.

Mahara, T. (2013). PEST- Benefit/Threat Analysis for Selection of ERP in Cloud for SMEs. *Asian Journal of Management Research,* 3(2), 365-373.

Makkar G. D., & Bist, M. (2012). EaaS - ERP as a Service. *Journal of Information and Operations Management,* 3(1), 141-145.

Marston, S., Li, Z., Bandyopadhyay, S., Zhang, J., & Ghalsasi, A. (2011). Cloud Computing-The business Perspective. *Decision Support Systems*, 51, 176-189.

Ministry of Small-Scale Industries. (2004). 'Report - India global summit on SMEs: Emerging Challenges and opportunities', New Delhi, India.

Motalab, M., & Sohag, S. (2011), Cloud Computing and the business Consequences of ERP Use. *International Journal of Computer Applications*, (0975 – 8887), 28(8).

Mozafari, M., Asli, M., & Bejestani, N. (2012). Why Selecting an Open Source ERP over Proprietary ERP? A Focus on SMEs and Suppliers Perspectives. *Journal of Basic and Applied Scientific Research,* 2(1), 680-684.

Munjal, S. (2006). Small is beautiful: ERP for SME, http://www.domain-b.com/infotech/itfeature/20060601_beautiful.htm.

Negi, T., & Bansal, V. (2009). Integrating Process and Data Model to aid Configuration of ERP Packages. *Lecture Notes in Business Information Processing (LNBIP)*, 21, 228-239, Springer Berlin Heidelberg

Neves, F. T., Marta, F. C., Correia, A., & Neto, M. (2011). The Adoption of Cloud Computing by SMes: Identifying and Coping with External Factors, Paper Presented at 11th CAPSI, 19th -21st October.

Rosemann, M., & Shanks, G. (2001). Extension and Configuration of Reference Models for Enterprise Resource Planning Systems, *Proceedings of the 12th Australian Conference on Information Systems (ACIS 2001),* eds.: G. Finnie, D. Cecez-Kecmanovic, B.Lo. Coffs Harboour, 537-546.

Saini, I., Khanna, A., & Kumar, V. (2012). ERP Systems: Problems and Solution with Special Reference To Small and Medium Enterprises, *International Journal of Research in IT & Management,* 2(2), 715-725.

Schubert, P. (2011). Cloud Computing for Standard ERP Systems: Reference Framework and Research Agenda, Available at http://academia.edu/Documents/in/Enterprise_Systems.

Sharma, M., Mehra A., Jola, H., & Kumar, A. (2010). Scope of cloud computing for SMEs in India. *Journal of Computing,* 2(5), ISSN 2151-9617.

Sharma S., Gray, C. W. J., & Daniel, E. M. (2007). ERP implementation: conception to completion: Issues Experienced by Indian SMEs', 18th Annual Information Resources Management Association International Conference on Managing Worldwide Operations and Communications with Information Technology, Vancouver, Canada, 19-23 May.

Yusuf, Y., Gunasekaran, A., & Abthorpe, M.S. (2004). Enterprise information systems project implementation: A case study of ERP in Rolls-Royce. *International Journal of Production Economics,* 87, 251-266.

COMMUNICATIONS

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