THE DETERMINANT OF ADOPTION OF ENTERPRISE RESOURCE PLANNING FOR SMALL AND MEDIUM ENTERPRISES IN IRAN

Nazli Sadat Safavi*

Mahyar Amini*

Seyyed AmirAli Javadinia*

Abstract: *The enterprise resource planning system (ERP) is a new class of packaged application software that has been appeared through the past decade, seemingly merging under a same banner with several of the largest software firms. These packaged software solutions tries to complete the range of a business's functions and process to be able to present a whole view of the business from singular information technology (IT)architecture. The small and medium size enterprise (SME) does not possess sufficient financial and human recourse, in comparison to the large size organizations; hence, it will not allow them to have a sufficient chance to compete with powerful competitors, in a business environment. However, the adoption rate of ERP in Iran is still in the beginning stage with not many adopters. As a result, this study focuses on the adoption of ERP among Iran companies. Seven factors were identified as determinants of ERP adoption by combining the two widely applied IT theories i.e.Diffusion on Innovation (DOI) and Technology-Organization-Environment (TOE) framework. In the future with eight factors we will conduct survey, factor analysis and logistic regression to determine factors affecting ERP adoption.*

Key words: ERP, ERP Adoption, Adoption Model, DOI Theory, TOE Framework, SMEs

*Faculty of Computing,Department of Information System, Universiti Teknologi Malaysia (UTM), Skudai, Malaysia

**Faculty Graduate Schools of Management and Economics, Sharif University of Technology, Tehran, Iran

1. INTRODUCTION

Globalization, internationalization of markets, the knowledge economy and e-commerce are just some of the challenges facing all firms, regardless of size[1]. If organizations are to survive and become more competitive in their new environment, they must make massive use of information technologies and information systems (IT/IS). This massive use of IT/IS has transformed the ERP systems market into the industry's fastest-growing sector[2].An ERP-system is an integrated, module-based, of the shelf software package aiming to control functional areas within the enterprise such as supply chain management, accounting and finance, material management, inventory control, and human resources[3-7].These systems provide an enticing solution to practicing industry executives to remove incompatible systems and inconsistent policies. Also, using these systems can bring enormous benefits such as easier information access in a fixed time interval, reduction in inventory levels and cycle times, shortening business process lengths and time, improvement in quality, supply chain management, high efficiency and low costs leading ultimately to competitiveness of the organisation[8-10].An ERP system enables an organisation to integrate all its primary business processes in order to enhance efficiency and maintain a competitive position without successful implementation of the ERP system, the projected benefits of improved productivity and competitive advantage would not be forthcoming[11, 12]. Literature suggests that adoption depends upon various factors during the course of initiation to benefits realization. These factors are influential and hence their understanding is critical to success[13].Investigators have generally given less concentration towards the adoption of IT by SME, this is especially correct of ERP adoption by SME. Most investigative discoveries cannot be simply incorporated into SME because of their specific features, ERP systems have focused on the big business sector until now [2, 14-16]. SME has restricted resources, budgets, and great sensitivity to costs. Risk and cost can be huge for SME enormous of hidden costs that impact on project success during the ERP life cycle [17, 18].

Hence, the purpose of this research is to study the factors that affect the adoption of ERP in companies. To obtain the data we observe companies in Iran. To find determinant factors, we studied a lot of literature. Among them, based on the previous studies devoted to adoption of IT in organization, by using the DOI theory and technology, organization, and TOE framework, we can have a view on the factors that can affect on the ERP adoption.

With these selected factors we will conduct survey in companies in Iran, factor analysis and logistic regression to prove that the seven factors really determine the ERP adoption.

2. DOI THEORY

DOI is a theory of how, why, and at what rate new ideas and technology spread through cultures, operating at the individual and firm level. DOI theory sees innovations as being communicated through certain channels over time and within a particular social system[19]. Individuals are seen as possessing different degrees of willingness to adopt innovations, and thus it is generally observed that the portion of the population adopting an innovation is approximately normally distributed over time. Breaking this normal distribution into segments leads to the segregation of individuals into the following five categories of individual innovativeness (from earliest to latest adopters): innovators, early adopters, early majority, late majority, and laggards. The innovation process in organizations is much more complex. It generally involves a number of individuals, perhaps including both supporters and opponents of the new idea, each of whom plays a role in the innovation-decision.Based on DOI theory at firm level[19], innovativeness is related to such independent variables as individual (leader) characteristics, internal organizational structural characteristics, and external characteristics of the organization[20].Individual characteristics describe the leader attitude toward change. Internal characteristics of organizational structure include observations. External characteristics of organizational refer to system openness[20].

3. TOE FRAMEWORK

TOE framework - it identifies three aspects of an enterprise's context that influence the process by which it adopts and implements a technological innovation: technological context, organizational context, and environmental context[21].Technological context describes both the internal and external technologies relevant to the firm. This includes current practices and equipment internal to the firm as well as the set of available technologies external to the firm. Organizational context refers to descriptive measures about the organization such as scope, size, and managerial structure. Environmental context is the arena in which a firm conducts its business, its industry, competitors, and dealings with the government[20].Implementing a new IT successfully depends for a large part on the organization's capacity to conduct the implementation project and integrate the changes brought about by the new system, that is, on the "organizational readiness" of

service firms for IT adoption and assimilation. It thus becomes important to identify the factors that determine this capacity. While many success factors have been identified, all can be put into one of the three categories of the TOE framework; hence the process by which a firm adopts and implements technological innovations is influenced by the technological, organizational, and environmental contexts[5].

4. RESEARCH MODEL

The review from the literature helped us understand the adoption of IT and the factors that determine the adoption. In this section, we combine used IT adoption models: DOI theory [19] and the TOE framework [21] to identify the determining factors of ERP adoption. The figure 1 below shows that seven factors are considered as the most determinants of ERP by combining both DOI theory and TOE framework.
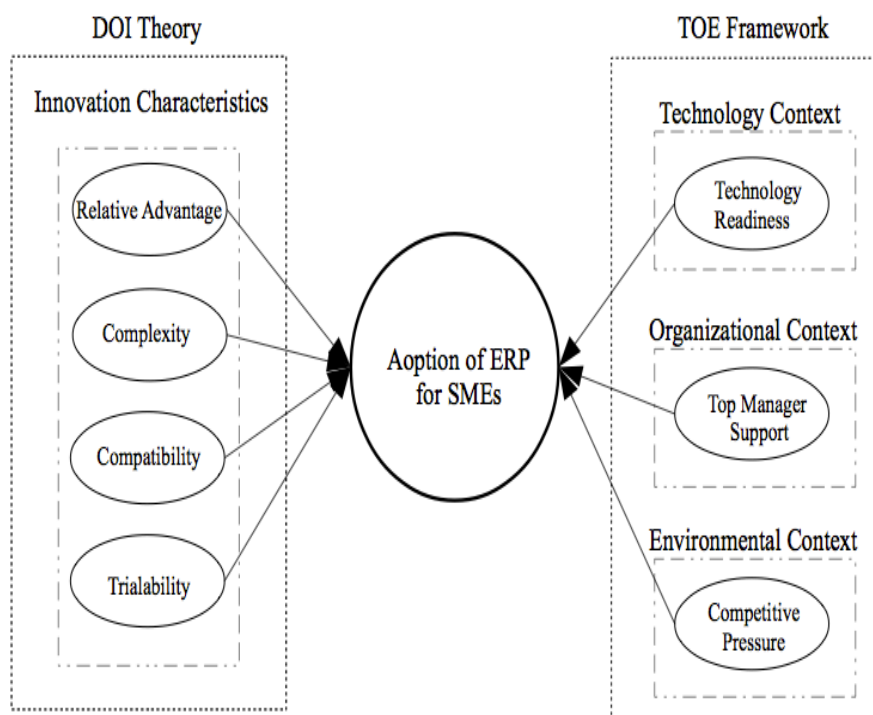

Figure1. Proposed Theatrical Model

H1 (+):_Relative advantage will be positively related with ERP adoption for SME._

H2 (--):_Complexity will be negatively related with ERP adoption for SME._

H3 (+):_Compatibilitywill be positively related with ERP adoption for SME._

H4 (+): _Trialability will be positively related with ERP adoption for SME._

H5 (+): _Technology Readiness will be positively related with ERP adoption for SME._

H6 (+): *Top Manager Support will be positively related with ERP adoption for SME.*

H7 (+): *Competitive Pressure will be positively related with ERP adoption for SME.*

We will use the logistic regression to test the degree of correlation of the variables with the ERP adoption. To measure the factors that affect on adoption of ERP in SMEs we use the following number of observed variables in the Table 1.

Table1. Number of Observed Variables for Each Factor

Name of Factor	Number of Observed Variables
Relative advantage	4
Complexity	4
Compatibility	5
Trialability	3
Technology readiness	4
Top manager support	5
Competitive pressure	4

To prove these hypotheses we will conduct survey in companies in Iran, factor analysis and logistic regression[22]. The logistic regression will have the following form.

$$g(y) = \beta_0 + \beta_1 RA + \beta_2 CX + \beta_3 C + \beta_4 T + \beta_5 TR + \beta_6 TMS + \beta_7 CP$$

Where:

- $g(y)$: The dependent variable, which is natural logarithm of the odds ratio.
- β_0: The constant and $\beta_1 \ldots \beta_7$ are coefficients of the independent variables.
- RA (Relative advantage), CX (Complexity), C (Compatibility), T (Trialability), TR (Technology readiness), TMS (Top manager support) and CP (Competitive pressure), are the dependent variable.

5. CONCLUSIONS

Investment systems are obviously phenomenal aspect of IT marketplace and their important capacity for companies who work with computers is undeniable[23]. According to considerable benefits such as job opportunity creation, making an impressive contribution to gross domestic product, promotion of entrepreneurship and innovation growth, Small and SME are in significant importance to economy. Former researches have demonstrated that SME is able to adopt enterprise systems successfully due to their specific

characteristics[24]. Although most of ERP system suppliers have concentrated their attention on SMEs recently, there is a limited contribution for SME[25]. In Iran, ERP is a new IT who have already adopted and implemented it to their business operations. The purpose of this study is to identify factors that affect the adoption of ERP in Iran. According to literature in prior studies on IT adoption we determined seven factors. These factors were the following: relative advantage, complexity, compatibility, Trialability, technology readiness, top manager support and competitive pressure.

In future we will use a questionnaire-based survey to collect the necessary data from SMEs. Factor analysis will be used to test the validity and reliability of the items constructed to measure the identified seven factors and proposed model. Finally, we will use factor analysis and logistic regression to test and prove the hypotheses of this study.

REFERENCES

1. Iskanius, P., *Risk Analysis of ERP Projects in the Manufacturing SMES: Case Study*, in *Electronic Engineering and Computing Technology*. 2010, Springer. p. 691-701.

2. Poba-Nzaou, P., L. Raymond, and B. Fabi, *Adoption and risk of ERP systems in manufacturing SMEs: a positivist case study.* Business Process Management Journal, 2008. 14(4): p. 530-550.

3. Hustad, E. and A.A. Bechina, *A study of the ERP Project Life Cycles in Small-and-Medium–Sized Enterprises: Critical Issues and Lessons Learned.* World Academy of Science, Engineering and Technology, 2011. 60: p. 2011.

4. Shehab, E., M. Thomassin, and M. Badawy, *Towards a cost modelling framework for outsourcing ERP systems*, in *Improving Complex Systems Today*. 2011, Springer. p. 401-408.

5. Uwizeyemungu, S. and L. Raymond, *Information technology adoption and assimilation: Towards a research framework for service sector SMEs.* Journal of Service Science and Management, 2011. 4(2): p. 141-157.

6. Muscatello, J.R., M.H. Small, and I.J. Chen, *Implementing enterprise resource planning (ERP) systems in small and midsize manufacturing firms.* International Journal of Operations & Production Management, 2003. 23(8): p. 850-871.

7. Chien, S.-W., et al., *The influence of centrifugal and centripetal forces on ERP project success in small and medium-sized enterprises in China and Taiwan.* ELSEVIER, 2007.

8. Al-Fawaz, K., T. Eldabi, and A. Naseer, *Challenges and influential factors in ERP adoption and implementation.* 2010.

9. Adam, F. and P. O'doherty, *Lessons from enterprise resource planning implementations in Ireland–towards smaller and shorter ERP projects.* Journal of Information Technology, 2000. 15(4): p. 305-316.

10. Haddara, M. and O. Zach. *ERP systems in SMEs: A literature review*. in *System Sciences (HICSS), 2011 44th Hawaii International Conference on*. 2011: IEEE.

11. Gupta, M. and A. Kohli, *Enterprise resource planning systems and its implications for operations function.* Technovation, 2006. 26(5): p. 687-696.

12. Amini, M. and N. Sadat Safavi, *Review Paper: Critical Success Factors for ERP Implementation.* Available at SSRN, 2013.

13. Al-Mashari, M., A. Al-Mudimigh, and M. Zairi, *Enterprise resource planning: a taxonomy of critical factors.* European journal of operational research, 2003. 146(2): p. 352-364.

14. Tomas, L.J., *ERP.* Se´lection, de´ploiement et utilisation ope´rationnelle, 2005.

15. Carton, D.F., *The impact of ERP integration on management decision making.* Business Information Systems, University College Cork, 2004.

16. Sadat Safavi, N., et al., *An Effective Model for Evaluating Organizational Risk and Cost in ERP Implementation by SME.* IOSR Journal of Business and Management (IOSR-JBM) Volume, 2013. 10: p. 70-75.

17. Aloini, D., R. Dulmin, and V. Mininno, *Risk management in ERP project introduction: Review of the literature.* Information & Management, 2007. 44(6): p. 547-567.

18. Teoh, S., *Competency and Capability Development Process: An SME Enterprise System Upgrade and Implementation.* Journal of Information Technology Management, 2010. 21(3): p. 36-50.

19. Rogers, E.M., *Diffusin of innovations.* New York: The freepress, 1995.

20. Oliveira, T. and M.F. Martins, *Literature review of information technology adoption models at firm level.* The Electronic Journal Information Systems Evaluation, 2011. 14(1): p. 110-121.

21. Tornatsky, L. and M. Fleischer, *The Process of Technology Innovation.* Lexington, MA, Lexington Books, 1990.

22. Amini, M., et al., *The Role of Top Manager Behaviours on Adoption of Cloud Computing for Small and Medium Enterprises.* Australian Journal of Basic and Applied Sciences (AJBAS), 2014. 8(1).

23. Soja, P. and G. Paliwoda-Pekosz, *What are real problems in enterprise system adoption?* Industrial Management & Data Systems, 2009. 109(5): p. 610-627.

24. He, H., *The Green Innovation Modes in Enterprise Systems of SMEs.* 2008.

25. Deb Sledgianowski, *SME ERP system sourcing strategies: a case study.* Emerald Group Publishing Limited, 2008.