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An Effective Model for Evaluating Organizational Risk and Cost in ERP Implementation by SME

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Abstract: *Enterprise Resource planning (ERP) implementations in the context of small medium size enterprises is discussed in this paper. It is essential for small businesses to success implementation an ERP system to maintain control of their risks. ERP implementation is costly and risky for small and medium enterprises. Paper identified from archived literature, ERP implementation risk in selecting and implementing an ERP system. Authors hypothesized a relationship between two elements of organizational risk factors, adequate system and business processes re-engineering. The study also examines the relationship between ERP implementation cost and ERP project success in order to better manage enterprises ERP projects in context of SMEs.*

Keywords – *ERP, ERP Implementation, ERP Organizational Risk, Cost of Implementation ERP, SME*

I. INTRODUCTION

All information and processes of an organization are integrated by ERP systems into a unified system. This unified system matters the way that organizations and people can collect, assess, summarize, interpret, gather and use the information[1]. In the case that ERP systems are successfully performed, all the functions of an enterprise are linked together[2]. 2009ERP projects encompass process reengineering, business processes and software systems in a way that they are interdependently closely linked. Fundamentally, ERP project and a simple software project are distinctive[3].

Small and medium-sized enterprises (SMEs) are studied in this paper. SMEs and larger enterprises are substantially different in principal ways which affect their information seeking practices that impact ERP[4]. Complex and prolix process of the ERP accomplishment usually encounter the company in many difficulties forcing it to eliminate different obstacles to project success [5] SMEs are highly sensitive to costs and limited in budgets and resources. Initially, many issues needed to be considered when SMEs manage to implement an ERP. Large number of mortgager and hidden costs in the course of ERP life cycle drastically heighten the total implementation cost[6]. When managers access inappropriately and mismanage the risks involved in the projects, it is considered as the most often cited reason for any software project failure. Risk management processes are often eliminated if a project scheme slips due to the fact that most of the project managers figure out risk management as supernumerary expense and work[7]. Formerly, different ways of improvement of the success rate of ERP introduction were proposed with no significant effect unfortunately. Risk factors and strategic need for the project, repetition of failed experience, innovation and etc define the nature of IT project risk[8].

This study is leaded by the efforts that have been made earlier by researchers and critiques. In summary, this study, by combining four concepts including ERP implementation, risks et al. three-level framework and organizational risk factors model efforts to make a more coherent model to measure effective cost on ERP project success. The objectives of developing such a framework are threefold: 1) to identify the adequate system and business performance risk factors for ERP implementation based on SEMs 2) To categorize the cost of ERP implementation on SMEs which related with adequate system and BPR risk factors 3) To recommend a framework to identify relation among organizational risk (adequate system and BPR) and cost factor and project success in ERP implementation base on SMEs. Choosing the most important criteria's of ERP implementation risk factors.

II. THEORETICAL CONTEXT

The research would discuss ERP implementation and the associate risks based on organizational risk by SMEs. This research would be examining cost that related with ERP implementation and also the affect of cost on ERP project success.

1. ERP Implementation in SMEs

ERP is originally designed for larger organisations are now thought to be of some benefit in equipping smaller. Firms who have smaller user populations and fewer financial resources[9]. ERP has been found complex and risky to implement in business enterprises. ERP implementation project was divided and classified into three phases: a) project, b) shake down, and c) onward and upward phases[10]. ERP system is introduced in the company within the project phase, and the success of this phase is measured according to cost and time completion within schedule and budget. Many ERP implementation are problematic, lengthy and above budget, are abandoned, scaled or altered, meet only partial implementation, are cancelled before completion, or unsuccessful to meet their business goals, even a year after implementation.

An ERP project should have a definite approach and operational target. Numerous companies install their ERP systems without understanding the need for conforming overall company goals and strategies as well as the repercussions for their business. Failed projects or weak systems where logic undermines with company goals are the outcome of this hurried approach[2]. Also, enterprises, which are not organised in the correct manner, fail to achieve the benefits because they do not recognize the full advantages that the ERP system presents. SMEs are more cost sensitive, as they do not possess similar quantities of resources as compared to what large enterprises possess. Furthermore, any cost increase or project deferments would adversely affect the SMEs' survival in the market.

The risks involved in the implementation of ERP projects are not well weighed or managed [3]. Due to the implementation time being stretched, SMEs either do not have adequate resources or are unwilling to pledge a significant portion of their resources, and costly fees connected to it. This is a result of SMEs not having similar quantities of resources, which other large enterprises possess. Hence, they are more cost sensitive. Furthermore, the SMEs survival in the market would be adversely affected by any cost increase or project deferments[11].

2. ERP Implementation Risk Factors

Numerous companies encounter problems when trying to implement the ERP system because the different departments within them have their own programmes and goals that clash with each other and the companies are not prepared for assimilation. ERP projects may indicate new barriers and present new risk factors that have to be handled in a different way. An ERP project is a significant and precarious exercise for any size of enterprise, but, risks are more for SMEs as the cost overruns during implementation may cause financial pressure on the firm and hence significantly affect the firm's performance[12]. Also, SMEs have a lesser chance of recuperating from a botched ERP implementation effort compared to large enterprises. Six chief dimensions of risks in ERP implementation is identified by[13], namely: 1)Organisational2)Business-related3)Technological4)Entrepreneurial5)Contractual and 6)Financial risks. Organisational risk stems from the environment in which the system is implemented. In the other words, organizational risk can be classified into:1)Business objective2)The degree of office automation 3)Capabilities in process re-engineering 4)The degree of required change[14]. With respect to their internal and external consistency, business-related risk stems from the enterprise's post-implementation models, artefacts, and processes. The information processing technologies needed to operate the ERP system for instance the operating system, database management system, client/server technology and network is related to technological risk. An incapacity to pay license fees or upgrading costs, for example, results from financial risk from cash-flow difficulties[15]. To evaluate the ERP success rate, this study takes into consideration the risks surrounding the ERP implementation at an SME level. It is crucial to study the risks involved and to be able to diminish them during the implementation phase as the financial and resource investment is rather significant for implementing such a system, if choosing to proceed. They are divided into different classifications for effective evaluation and reduction of risks, as follows:

Table 1 - ERP Implementation Risk Factors

RISK FACTORS	REFERENCE
Technological complexity, Degree of novelty or structure of the application, Technological change, Project size	[16]
Complexity, Lack of structure, Instability of project objectives, Newness of the technology users, IT management, Upper management, Project size	[17]
Insufficient training and rescaling, Insufficient internal expertise, Lack of analysts with the knowledge of business and technology, Failure to mix internal and external expertise effectively unable to comply with The standard which ERP software supports, and lack of integration between enterprise wide systems	[5]

Top management support, project team competence, Interdepartmental cooperation, Clear goals and objectives, Project management, Interdepartmental communication, Management of expectations, Careful system selection	[18]
Inadequate ERP selection, Poor project team skills, Low top management involvement, Ineffective communication system, Low key user involvement, Inadequate training and instruction, Complex architecture and high numbers of modules, Inadequate business processes, Bad managerial conduction, Ineffective project management techniques, Inadequate change management, Inadequate legacy system management, ineffective consulting services experiences, poor leadership, inadequate IT system issues, inadequate IT system maintainability,	[6]

3. Adequate ERP System

In the implementation of a project, selection of an ERP goes crucial. Evidence demonstrates that the selection process initiates a consideration of the finance from different perspectives including price, support, vendor, flexibility and implementation time[19]. The better the ERP selection is, the greater the chance of success would be. So, various kinds of methods have been proposed to select a suitable ERP. And, the number of implementation modules heightens project complexity. Also, key architectural considerations are important in the course of initiation and adoption phases to eliminate the necessity for extra software like data warehousing. Personalization and adaptation of tools may bring trouble if the project is not sufficiently planned. Moreover, the most important ERP selection criteria are adaptability and flexibility of the software[19]. If wrong choices are made for choosing the most convenient software package solution which is the key concern, either the need for significant turnovers or an inconformity between the package and business processes and strategies are the troubles that the company will be faced with in which the procedure is costly, risky and time-consuming. Therefore, company's performance is affected when an inappropriate project is carried out. Functionality, costs, technology and support are the major criteria that should be considered while evaluating both vendor and package. Other criteria for selecting ERP system that mention by Tsai [20] are system quality, user satisfaction, and ease of integration with other system.

4. Business Process Re-Engineering

Business operations of an organization normally consisted of stand-alone legacy systems that were unable to communicate with each other prior to the development of comprehensive ERPs. Using a process-view of the firm, ERP systems highlighted this problem through the assimilation of all business processes. A vital component of this process-view is its use of a central database which lowered data idleness, enhanced data consistency and reliability, and allowed sharing of common data throughout all business functions in a real-time environment. Mainly, ERP systems pledged substantial advantages, and firms implemented them with the target of substituting ineffectual standalone legacy systems, expanding communications between business functions, expanding information processing competences, enhancing customer relations, and enhancing overall decision making[21]. The project was considered throughout by a swift development style. But, the fact that there were few visibly demarcated preliminary objectives and goals was a double-edged sword for the project team, in that it eased them to demarcate the new system without restrictions, but it also pushed them to undertake the additional encumbrance of process and BPR design, normally a time and resource exhaustive factor of development. The project team recognized their own critical success factors after having created the system requirements, chosen the system, the vendor and consultants[22]. Companies must enhance their own business practices and procedures in order to survive in this situation. Enhancements to business processes can take one of three forms: a) Enhancing process dependability through six sigma and other total quality tools, b) Decreasing process difficulty through lean manufacturing, and c) Managing the separate factors of the overall set of business processes through enterprise resource planning (ERP)[23].

5. Cost Factor

Due to the implementation time being stretched, SMEs either do not have adequate resources or are unwilling to pledge a significant portion of their resources, and costly fees connected to it. This is a result of SMEs not having similar quantities of resources, which other large enterprises possess. Hence, they are more cost sensitive. Furthermore, the SMEs survival in the market would be adversely affected by any cost increase or project deferments. Apart from software, items such as training, hardware, and consulting are included in the costs with ERP implementation. As mentioned in the previous research, the failure of certain companies to

compare actual versus budgeted costs is due to a lack of a formal budget. Correspondingly, a relative measure of actual project cost as a percentage of annual revenue was used. The project costs in five classifications (software, coaching, alterations, services and others) were required to be detailed by the accounting manager from each company as well as to provide a forecast of the annual revenue for the present year.

Selecting the most suitable software package solution is a key concern: if wrong choices are made, the company will be faced with either a mismatch between the package and business processes and strategies, or the need for major modifications, which are time-consuming, costly and risky. Both vendor and package have to be evaluated through a structured multi-criteria approach (functionality, technology, support, costs)[24].

Business process integration is more costly, These costs are driven by a variety of factors which include the high consultancy fees charged by consultants and systems integrators, the heavy reengineering focus the need to replace high percentage of existing information technology infrastructure in order to support the ERP systems[11].

Project cost was assimilated in the cross-case analysis of benefits so that if two companies gained similar benefits but at different costs, the company that sustained the lower project cost was considered as somewhat more successful[25].

III. THEORETICAL CONTEXT

This study creates three hypotheses according to the literature. ERP implementation projects are the most challenging of systems in project development. Complexity, enterprise wide scope and challenges set by large-scale organizational modifications in transition to new systems and business processes set ERP projects apart. Evidence demonstrates that the selection process require a heed of the investment from different viewpoints such as price, marketer, implementation and flexibility time. Also, appropriate requirement analysis could support the software selection process.

Determination of particular features which are needed for running the business is one of the methodologies of software selection especially for small companies that have very limited resources and cannot provide extensive consulting services or purchase expensive software. Although, their operations principles and businesses possesses different features that should be put in consideration while selecting the ERP software[26]. Claim that inadequate ERP needs many well cause a misfit between ERP system and the SME, which increase the cost indirectly. So, first hypothesis is all about the impact of adequate system risk on the cost of ERP project.

***H1**: Adequate system risk has indirect positive effect on cost.*

Complexity of ERP projects makes the organization require reliance on various types of expertise often provided outside the organizations. Frequently, consultants advise managers to tackle some degree of re-engineering of key processes before obtaining ERP systems. Consequently, this enhance the complexity as well as political character in projects[27].

Managing a program of wide-ranging company is necessary for a successful ERP implementation which is rather than a software installation effort[28] .Challenges of re-engineering process to coordinate the process with investment in recruiting and rescaling technology professionals, ERP software supports, the challenge of using consultants sourced outside the organizations, the challenge of recruiting and keeping business analysts who make combination between business skills and technology and the risk of technological pinch in client/server implementation are some of the unique challenges and risks in managing enterprise-wide projects.

Principally, carrying out BPR prior to ERP is always better however these are closely connected together. Practically, it does not seem easy do because ERP is an effort intensive activity, which is costly and time-consuming. Moreover, performing BPR prior to ERP connotes that the enterprises require putting resources into two consecutive projects. ERP packages provide many worthy premier business practices deserving to be as a part of BPR[29].

When an enterprise is going to activate a Business process Engineering/Re-engineering project, implementation of an ERP system is mostly necessary, then, enterprise processes can be adapted to those constructed within the ERP system. Besides, it seems crucial or someway "negative" for a small enterprise whose business relies on its particular and appropriate business process.

The cost of ERP projects can be decreased using adequate business process re-engineering as explained above. So, this study concerns BPR as a factor, which has principal importance in organizational risk. Therefore, the second hypothesis is defined as follows:

***H2**: Adequate business process re engineering risk indirect positive effect on cost.*

SMEs become very popular in the recent years in order to improve manufacturing industries business and business partnering with large companies, but ERP implementations requires widely investment. In addition, the system adoption is time consuming and costly, but the system installation has many advantages for

SMEs[30].Since SMEs have IT competencies and limited financial resources, ERP-projects might be more risky compared to large companies. On the other hand, the unsuccessful ERP implementation in a SME is too costly. As a result, the risk experience information with ERP systems is quite necessary to have a successful project.

Because of the demanding, being time-consuming and running over budget are the criteria that ERP systems have been criticized for not be keeping up to their promises. Many ERP implementations are hard to do, time-consuming and over budget, are obsolete, scaled or modified, achieve only sectional implementation, are terminated before completion, or failed to attain their business targets even a year after implementation[31] .

There have been many researchers in the recent years to design successful ERP implementation system to avoid mistakes and perform prosperously[32].One of the most important problems in IT investments is uncertain costs measuring of ERP implementation system that cause many difficulties for management [33]. The companies are convinced to apply ERP implementation system by its advantages such as decreasing in expenses, improving coordination of business processes and reducing of redundant data by different departments that enhance business's operational capacity and achievement of business goals. Therefore, this study focuses on recognition of risk factors analysis. Based on this model, cost on the project failure or success influences by the organization risk factors performance. So, the hypothesis three determined as following:

H3*: correct estimated cost lead to project success.*

IV. CONCLUSION

This study surveyed organizational risk (In particular business process re-engineering and adequate ERP system) affect on cost and ERP project success. Here, different characteristics of ERP projects for SMEs are presented in addition to specification of ERP systems requirements, business process development, limitations and risks that could affect these kinds of projects. Many studies have surveyed ERP. Many studies have surveyed ERP implementations in large organization, less have focused on SMEs. SMEs have limited budget and implementation of an ERP system is not a issue of changing the hardware or software systems [8], instead it comprises transforming the company to a higher level of performance through a simplified business process[34] .Costs play important role in SME's and increase of budget lead ERP implementation project to fail. From a practical point of view, comprehending the determinants of ERP implementation risk avoid SMEs from additional costs. SME have fewer risk with choose Adequate ERP system, which flexible business processes and SME goal by this attitude SME can increase, costs that direct related with this risks.

Additionally, a clear business plan and vision to steer the direction of the project is needed throughout the ERP implementation. A business plan that outlines proposed strategic and tangible benefits, resources, costs, risks and timeline is critical. This will help keep focus on business benefits and reduce the risk factors.

Basically organization risk causes indirect effects on cost, because in implementation phase only some specific elements might be considered, but this does not apply to all features of organization risk. Cost effects are slinky in first stage, and highly depend on company situation and its ERP implementation risk may increase or decrease.

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