Abstract No : 025-0513

Impact Of ERP Implementation Process On Decreasing Risk In Supply Chain

Hossein Rikhtehgar Berenji

Sharif University of Technology

No.4, Shabnam Alley, Shahid Araghi St, Ressalat Highway, Tehran, Iran

h.rikhtehgar@gmail.com

Mahdi Abbasi

Islamic Azad University -Toyserkan Branch, Iran ,

abbasi.mahdi@gmail.com

POMS 23rd Annual Conference
Chicago, Illinois, U.S.A.
April 20 to April 23, 2011

Over recent years, as the ERP implementation grew in several companies and different experiences achieved for different results, one of the concerns of the directors was to determine the necessity and the method of implementation.

Since companies are not the same in procedure and context, they are differently affected by ERP. In this article we discuss the effect of ERP implantation on the business and the risk reduction of the supply chain. Since the method of implementation can affect the results, in the survey we used the step-by-step model with the phases explained later for the implementation to keep the overall results intact.

1. Introduction

As the provided services in a company or an organization grow, one of the concerns of the directors is the risk reduction, such that in addition to preserving the initial stock, assured profit along with the development and growth of the company are guaranteed. The main point that should be considered is the correlation between the risk factors, which if neglected can result in unrecoverable financial damages and waste of time. Generally people that are familiar with the system are employed to extract the risk parameter terms and the goal is achieved by summarizing different opinions.

Now consider a large organization, which consists of several units with different locations and island management. It's obvious that there are few people that are aware of all of the units and their relations. Also because of symptoms such as poor management, unreliable data and the presentation form of data increase the risk in the business. Therefore comparing the supply chain risk between two similar organizations in this article, we study the effect of ERP implementation on risk reduction. One organization uses the traditional system and the other one takes advantage of ERP.

In the first chapter we generally discuss the risk in the supply chain, in the second chapter ERP implementation is explained in more details, and in the third chapter we compare the risk factors of the supply chain with and without the presence of ERP. At the end the discussion and analysis are provided.

2. Risk factors in the supply chain

Companies reviewed in this article are manufacturers with foreign exchange. Therefore external factors also exist in studying the effective risk factors.

The set of processes from collecting the ingredients to delivering the product to customers and after-sale services is called the supply chain. In this chain, risk factors are the parameters that prevent the normal progress of the supply chain or affect the speed of the progress.

Supply chain risk covers all risks in the product, materials, information flow from initial suppliers to final product delivery (Christopher, 2003). Using classic definition of Seven Rs about logistics goal (i.e. ensuring availability of right product at right amount, situation, place, and time for customer), the supply chain risk can be defined in a way to determine whether supply chain has deviated from above profile or not. If supply chain delivery fails to fit with above characteristics and any of these dimensions, then we can say that a mistake has been occurred in a specific dimension. This can be a definition of supply chain disruption.

Waters (2007) introduced risks in long categories: Strategic, Natural, Political, Economic, Physical, Supply, Market, Transport, Products, Operations, Financial, Information, Management, Planning, Human, Technical, Criminal, Safety and Environment (Waters, D., 2007) As it is seen, apparently there are different categorizations of supply chain risks equal to the number of mentioned authors and probably it is caused by their different views. Hence, it can be concluded that presented categorizations of supply chain risks are highly dependent on researcher

perspective. But it is clear that despite of observed variety, natures of stated risks in the references are highly similar and we can extract relatively more integrated view of these factors.

3. ERP Implementation

It is hard to give a comprehensive definition of ERP. Experts have given different definitions for ERP that each one highlights a particular aspect of the system. In this chapter we explain various definitions of this system, so that we can prepare the background needed for the next chapters.

- ERP can be defined as integrated software which is composed of components or modules for planning, production, sales, marketing, distribution, accounting, human resource management, project management, service and maintenance and reparation management, transport and e-commerce management. Architecture and structure of ERP is such that it provides the integration of information all over the organization and causes a smooth flow of information between several units of the organization. (Ifinedo, 2010)
- A method for planning and effective handling of all the resources required for obtaining, producing, dispatching, and responding the customer needs in manufacturing, distribution, and service companies. (Hakim, 2010)
- ERP is a business software package, which is aimed at integration of the information and information flow between all parts of the organization such as financial, accounting, human resources, supply chain, and customer management.
- ERP is a database, an application program, and an integrated interface all over the organization. (Aladwani, 2001)
- ERP is a standard software package consisted of several integrated and related modules which supports all of the business processes of an organization including production,

human resources, financial, marketing, sales, etc. and results in integration of functions of the organization.

- ERP resembles the information backbone of an organization in terms of database and organizational processes and software to support the inter-organizational processes. (Motwani, 2005)

This is a large claim! A software program, which is capable of meeting the needs of accountants and human resources. Each unit has its own computer system for optimizing its performance, but ERP combines them as an integrated software program. This program runs through a database, hence several units can easily share the information and communicate with each other. This integrated method, if installed properly, has many benefits.

For example: reception of the customers' orders. When the customer actually orders, the order circulates through different units electronically or on a paper. This circulation delays the response to the customer; also none of the employees knows the status of the order at each point.

ERP breaks through the isolated computer systems in financial, human resources, and data warehouse units, and replaces them with integrated software programs divided into software modules. In this manner although the financial, manufacturing, and data warehouse units have their own software, these software are now linked together, such that the financial unit referring to the data warehouse can be informed on the delivery of the order. Most of the ERP software packages are flexible, meaning you can install only a set of modules without purchasing the whole package (Velcu, 2010). For instance, some companies only install the financial or human resources modules of ERP.

3.1. Cons and pros of ERP

In this sub-chapter we mention a few advantages and disadvantages of ERP.

3.1.1. Advantages of ERP

1- The proportion of its establishment to the benefits of it in the organization is 1 to 10.

2- once established increases the efficiency of the organization in a short time.

3- Better and more effective management of the budget results in improvement on planning and financial processes.

4- Results in effective support on the process of decision-making.

5- the implementation provides an implicit opportunity to reengineer the organization.

6- causes the simplification and standardization of the methods.

7- Results in customer satisfaction.

8- In the long-run reduces the need for investment on the IT section.

9- Investment return is achieved sooner than the time required for in-house software development.

10- creates joint-organizational tools in the accomplishment of the processes and the systems.

11- Distinct and scattered systems will be eliminated.

12- Ineffective manual processes will be eliminated.

13- Integration of all the operations is already done.

14- Dependency on manpower will be reduced.

15- Sharing the information at the business level will be achieved easily.

16- Vendors and providers can be connected together online. (Aloini, 2007)

3.1.2. Disadvantages of ERP

We can mention some important disadvantages of ERP like:

1- Relatively high initial cost

2- High risk

3- Many sections of the organization are involved.

4- Many organizations don't use all of the ERP features.

5- ERP implementation requires a lot of resources.

6- Relatively long time is required for implementation in large organizations. (Sanchez, 2010)

Like any other project, ERP implementation projects need arrangements and preparing facilities to reduce the risk of failure and to make the progress of the implementation phase reliable. Time and cost of the ERP establishment project is higher than other software systems and so it is worth to study the aspects before the implementation, which it's also costly. (Salmeron, 2010)

4. Risk analysis in two companies (Case study)

We conduct a case study for our research in two different companies which one of them use ERP and the other do not use. After that we compare the supply chain risks in these two companies using fuzzy ANP and fuzzy TOPSIS.

TOPSIS technique has been used because of these four benefits:

- Having a valid ratiocination to describe logic of individuals truly;
- Calculating numerical value for best/worst alternatives;
- Having simple computational process, which is easily programmable in spreadsheets;
- Multifaceted performance of alternatives in criteria (at least in two faces) is imaginable (Hsu-Shih, 2007).

In this method we can evaluate the risks and compare the companies situation against each other. " Alborz Mehr" is a manufacturer in Plastic industry. This company impalement ERP

in their company. “Tolooe Pars” is other company in Plastic industry also. They do not implement ERP.

We compare the situation of risks in supply chain between these two companies via FANP and FTOPSIS and the results are as follow:

	di*	di-	ccj
Tolooe Pars Company	1.1755	1.9347	0.8745
Alborz Mehr Company	1.3847	1.2498	0.3837

Table 1 : Results from FTOPSIS technique

In this article for risk analysis, experts were asked about the risk in every company and the correlation between each pair of the companies. To prioritize the risk factors in each company, matrix $\tilde{A}$ is formed as the equation below:

$$\tilde{A} = \begin{bmatrix} 1 & \tilde{a}_{12}^{\alpha} & \cdots & \cdots & \tilde{a}_{1n}^{\alpha} \\ \tilde{a}_{21}^{\alpha} & 1 & \cdots & \cdots & \tilde{a}_{2n}^{\alpha} \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ \tilde{a}_{n1}^{\alpha} & \tilde{a}_{n2}^{\alpha} & \cdots & \cdots & 1 \end{bmatrix}$$

Which in this matrix, $\tilde{a}_{ij}^{\alpha}$ is the index of the optimism of element i in element j. Comparing these matrices in two companies, it can be seen that the value of $\tilde{a}_{ij}^{\alpha}$ elements in Tolooe Pars Co. is higher than Alborz Mehr Co. Considering that with ERP implementation in a company or organization, all sections have more interactions, this result was not out of expectation. Next, examining the risk factors of the two companies one by one, we observed that in most cases the amount of the reported risks in Tolooe Pars Co. was less than Alborz Mehr Co.

5. Conclusion

Further investigations showed that the reason is having authentic and up-to-date information, which is the result of an integrated information system. For example all the information of a product from production to sale and after-sale services is easily at the programmer's disposal. Observing the results of change progress causes the logical decision according to authentic data, not the speculations of the managers. According to what was said, in case necessary infrastructures already exist, ERP implementation results in risk reduction in the supply chain.

6. References

1. Davide Aloini, Riccardo Dulmin, Valeria Mininno, Risk management in ERP project introduction: Review of the literature, Information & Management 44, 2007, 547–567

2. Adel M. Aladwani, Change management strategies for successful ERP implementation, Business Process Management 7 (3), 2001, p. 266.

3. Christopher, M. et al., understanding supply chain risk: A Self-Assessment Workbook, Department for Transport-Cranfield University-cranfiled University, 2003.

4. Princely Ifinedo, Birger Rapp, Airi Ifinedo, Klas Sundberg, Relationships among ERP post-implementation success constructs: An analysis at the organizational level, Computers in Human Behavior 26 , 2010, 1136–1148

5. Amin Hakim, Hamid Hakim, A practical model on controlling the ERP implementation risks, Information Systems 35 , 2010, 204–214.

6. Jaideep Motwani, Ram Subramanian, Pradeep Gopalakrishna, Critical factors for successful ERP implementation: Exploratory findings from four case studies, Computers in Industry 56 2005, 529–544.

7. Jose L. Salmeron, Cristina Lopez, A multicriteria approach for risks assessment in ERP maintenance, The Journal of Systems and Software 83, 2010, 1941–1953

8. Vinod Kumar, Bharat Maheshwari, Uma Kumar, An investigation of critical management issues in ERP implementation: emperical evidence from Canadian organizations, Technovation 23, 2003, 793–807.

9. Jaideep Motwani, Ram Subramanian, Pradeep Gopalakrishna, Critical factors for successful ERP implementation: Exploratory findings from four case studies, Computers in Industry 56 (2005) 529–544.

10. Oana Velcu, Strategic alignment of ERP implementation stages: An empirical investigation, Information & Management 2010 .

11. Lluis-Santamara-Sanchez, Manuel Nunez-Nickel, Susana Gago-Rodriguez, The role played by interdependences in ERP implementations: An empirical analysis of critical factors that minimize elapsed time, Information & Management 47, 2010, 87–95.

12. Waters. D. , Supply Chain Risk Evaluation Based on Fuzzy Multi-Criteria Lattice-Order Decision-Making, International Conference on Automation and Logistics, 2007.