

# ***WHAT DETERMINES USER SATISFACTION IN ERP PROJECTS: BENEFITS, BARRIERS OR RISKS?***

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## ***Abstract***

ERP systems are cost and complex systems. They require heavy investments. However, post implementation reviews of ERP projects are not commonly realized, though, they may give insights about what to do with benefits, barriers and risks. First, the research conducted a literature review on ERP benefits, barriers and risks. Second, benefits, barriers and risks are checked with their effects on user satisfaction in ERP projects.

***Keywords:*** ERP, ERP benefits, ERP barriers, ERP risks, User Satisfaction in ERP projects

## **1. INTRODUCTION**

In recent years, while the rise of the Internet has been the subject of most of the media's attention, the business world's focus on enterprise systems may in fact be the most significant shift in the organizational use of IT in the 1990s (Al-Mashari et al 2003). Rajagopal (2002) described ERP as the most effective IT application on the entire organization. Parr and Shanks(2000) discussed motivation for ERP implementation in 3 categories such as technical, operational and strategic. ERP systems are effective in rise and fall of organizations in an increasingly competitive market where globalization has been localized (Sarkus and Gunasekaran, 2003). Furthermore, firms aiming to use ERP software should realize project plans. Since ERP projects are complex, there are some barriers to ERP projects. Furthermore, risks may occur if barriers are not solved adequately. When barriers are solved, it's expected to gain important benefits from ERP projects.

## **2. DEFINITIONS AND PROPERTIES OF ERP**

There are lots of definitions about ERP in the literature. Many of the definitions for ERP focus on such properties of ERP as integrating processes, enabling optimization across the organization, elimination of complex links between computer systems, providing a common IT infrastructure, linking through the supply chain, adapting best industry and management practices for providing the right product at the right place at the right cost, tracking the status of a company's day-to-day activities, achieving consistency and efficiency through standardization, enhancing of market value and firm performance through efficiency and effectiveness gains, providing a quicker response to customer requirements and creating common measures (Hirt and Swanson,1999; Rao,2000; Bendoly and Jacobs, 2004; Huang, Palliers, Pan, 2003; Hunton et al 2003, Huang et al 2003). Hsu and Chen (2004) discussed the importance of ERP into an integrated, process-oriented, information-driven and realtime organization where Sarkis and Gunasekaran (2003) stressed the effects of ERP on competition.

Oliver and Romm(2002) emphasized the improvement in image as a factor in ERP adoption. The other factor in ERP adoption is high percentage of failure in information system projects which caused a shift from individual development to standardized, prepackaged software solutions (Scheer and Habermann, 2000). However; Sammon and Adam (2004) noted that high rates of failure also exist in ERP project implementation due to combined effect of inadequate organizational analysis at the beginning of the project, the complexities of ERP market and complex implementation. Sprott (2000) discussed that market leading enterprise applications represent some of the largest, most complex applications on the plant and explained the reasons of complexity of ERP software as highly generalized nature of packaged applications and the need to adapt and rapidly evolve to meet requirements in different situations. Adam and Doherty(2000) explained the reason of complexity as requiring reliance on many different types of expertise often sourced outside the organization. Because of the problems with ERP, the image of ERP seems to have changed from a highly promising into a highly demanding technology (Boersma and Kingma, 2005). Since ERP system are profoundly complex pieces of software and costly systems (Davenport, 1998, Al-Mashari et al 2003, Luo, Strong, 2004, King, Burgess, 2006, Kumar et al 2003, Somers, Nelson, 2003, Hsu, Chen, 2004), installing them requires large investments of money, time and expertise (Davenport, 1998, King, Burgess, 2006).

### **3. BENEFITS, BARRIERS, RISKS AND USERS IN ERP PROJECTS**

Adam and O'Doherty (2000) state that though ERP systems have beneficial effects, these benefits are matched with high level of risk because of complexities of ERP systems. Soh (et al 2000) reports that some companies even abandon implementation of ERP projects or achieve only some of the benefits they aim (Martin and Cheung, 2005, Sammon and Adam, 2004, Al-Mashari et al 2003). King and Burgess (2006) reports that many implementations of ERP have been criticised regarding the time, cost and disruption caused by the implementation and sometimes limited benefits once the systems become operational.

Soh (et al 2000) points out about the problems caused by the difference between functionality offered by the package and that required by the firm in ERP projects. While trying to adjust the ERP software and the system in the enterprise, there will be some barriers. Barriers cause firms to experience a decrease in organizational performance instead of realizing improvements (Hirt and Swanson, 2001). Hawking (et al 2004) discusses the role of barriers in limiting the realization of benefits and categorizes barriers as People, Process or Technology related barriers. Organizational change is one of the most important barriers encountered in transition new systems and business processes (Kumar et al 2003) and is an important reason for the failures(Al-Mashari et al 2003, Khawk, 2006, Hong, Kim, 2002).

The barriers should be solved before the system goes live. If the barriers are not solved, they may act as drivers of risks. Sumner (2000) defines a risk as a problem that has not yet happened but which could cause some loss or threaten the success of your project if it did. Teltumbde (2000) defines risk as the measure of the degree of possible variation in the outcome or benefits of the project. He also relates the risk of ERP projects with the size of the investment and the complexity of the enterprise and categorizes risks as project management-related risk, technology-related risks and process-related risks. Hitt and Zhou (2002) summarizes risks as technical and business risk. Luo and Strong (2004) point out that risks in ERP projects are relatively higher than they are in traditional projects. Somers and Nelson(2003) claim that though supplementary redesign of business processes promises the

highest return on investment, it also increases the level of complexity, risks and costs. Aladwani (2001) explains the perceived risk as a reason for rejecting to use an ERP system. Teltumbde (2000) relates the risks with intrinsic product design and suggests assessing the risks and the benefits carefully during the evaluation process.

Helm (et al 2003) concludes that it's impossible to succeed in a technological application unless people have positive attitudes about it and behave in ways that enable to get benefit from it. Yang (et al 2006) suggests that the key success factor for implementing ERP system is the people centered, and Light(2005) points out that the only way of achieving the perfect system is to involve end users. Owing to the importance of people in ERP implementation, people related measures were developed. Two of the measures developed are: 1)user satisfaction (Yang et al, Zhang et al 2005), and 2) expectation success, defined as IT systems match with user's expectations (Al-Mashari et al 2003).

The aim of the study is to identify the effects of benefits, barriers and risk on user satisfaction in ERP project.

#### 4. METHODOLOGY

In the methodology section, a research model related with the research problem is developed. Furthermore, 4 hypotheses are developed to test the relations between the variables.

##### 4.1. Research Model and Hypotheses

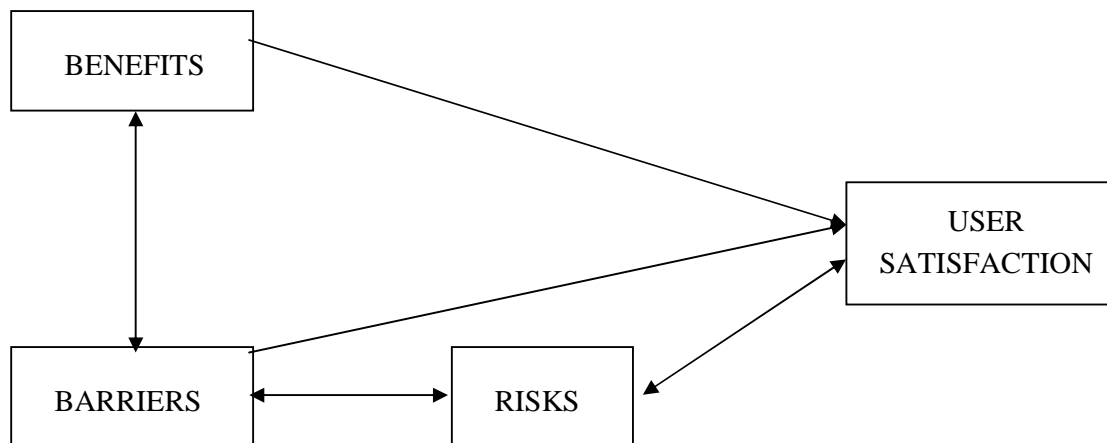


Figure 1: Conceptual Model of the Research

The hypothesis developed for testing the research model are explained below:

- H1: The benefits of ERP projects are related with the barriers in ERP projects.
- H2: Barriers in ERP projects are related with risks in ERP projects.
- H3: Benefits are related with user satisfaction in ERP projects.
- H4: Barriers are related with user satisfaction in ERP projects.
- H5: Risks are related with user satisfaction in ERP projects.

## 4.2. Data Collection

The research was conducted at a Turkish branch of a Switzerland-based multinational enterprise. An ERP project was realized in all of the branches of the multinational enterprise and a project plan covering all branches was developed. According to the project plan, ERP project in Turkey branch was realized between December 2004 – October 2005. The project lasted 11 months. A questionnaire was developed to evaluate ERP project. The main variables used in the questionnaire were about: 1) Benefits in ERP projects, 2) Barriers in ERP projects, 3) Risks in ERP projects, 4) User satisfaction in ERP projects. The scales used for variables are explained in Table 1.

	Scales Used from Literature	Question Type
Benefits	Murphy, Simon (2002); Ollhager, Seldin(2003); Trott, Hoecht (2004); Genoulaz, Millet (2005); Hawking, Stein, Foster(2004)	Likert Type, 1= I've never experienced, ....., 5= I've experienced too much.
Barriers	Kumar, Maheshwari, Kumar(2003); Hawking, Stein, Foster (2004)	Likert Type, 1= I've never met, ....., 5= I've always met
Risk	Kumar, Maheshwari, Kumar(2002)	Likert Type, 1= I've never met, ....., 5=I've always met

*Table 1: Scales Used in Questionnaire*

One question was used to evaluate user satisfaction. It was asked as a Likert type 5 scale question as 1= ERP project is too below of my expectations, ....., 5= ERP project exceeded my expectations.

The questionnaire was given to ERP users 20 November 2006 through 20 December 2006. In the introduction part of the questionnaire, the aim of the questionnaire was explained. The questionnaire was given to the users 14 months after the project was finalized.

## 4.3. Analysis

Analysis will be given in the following order:

1. Participants
2. Analysis of benefits, barriers and risks.
3. Test of H1, H2, H3 and H4.

### 4.3.1. Participants

The questionnaire was given to all the people who use ERP software in the firm. It was given to 32 people and 25 of them responded the questionnaire. The response rate is 78%. 28% of the participants age are below 30; 32% are between 31-36 and 40% are above 37. 48% of the participants had been working in the firm for less than 5 years where 52% of the them had been working in the firm for more than 5 years. 60% of the participants were male, 40% of the participants were female. 8% of the participants were managers, 64% of the participants were ordinary staff and 28% of the participants were superusers. 44% of the participants worked in ERP project whereas %56 of them didn't work in ERP project.

### 4.3.2. Analysis of Benefits, Barriers and Risks

In Table 1, benefits gained from ERP project will be analyzed by using mean and standard deviations.

<i>Benefits</i>	<i>Mean</i>	<i>St.Dev.</i>
Cost reduction	3,08	,572
Cycle time reduction	2,44	1,044
Productivity improvement	2,8	,707
Quality improvement	3,12	,927
Performance improvement	2,88	,680
Better resource management	3,3	,703
Support business growth	3	,798
Generate product differentiation	2,92	,654
Decreased financial close cycle	3,56	,768
Increased IT infrastructure capability	3,96	,690
Lowered inventory levels	2,65	,573
Facilitate business learning	2,92	,830
Improved decision making	3,17	,917
Support organizational changes	3,17	,761
Build common visions	2,96	,751
Quickened information response time	3,67	,868
Improved order management/order cycle	3,38	,770
Improved interaction with customers	3,30	,765
Improved on-time delivery	3	,511
Improved interaction with suppliers	3	,780
Improved cash management	3,43	,728
More efficient business processes	3,26	,689
Better coordination and cooperation between functions and different company departments	3,17	,868
Better management and controlling functions	4,13	,757
Possible redesigning of ineffective business functions	3,33	,761
Control of flow of goods	3,75	,737
Information flows control	3,96	,690
Financial flows control	4,08	,830
Faster, more accurate transactions	3,42	,654
Better logistics	3,21	,588
Increased revenue	3	,511

*Table 2. Perception of Benefits in ERP Project.*

As seen in Table 2, the top 6 benefits gained in the ERP projects are as follows: Better management and controlling functions, financial flows control, information flows control, increased IT infrastructure capability, control of flow of goods and quickened information response time. The firm experienced performance improvement mainly from the information perspective as stated in Olhager and Seldin(2003). Before ERP, there was a fragmented system and there was no integration between modules. Better management and controlling

functions, financial flows control, information flows control, quickened information response time are gained with the integration of processes realized with the ERP project.

The results in Table 2 also show that the least important 6 benefits are as follows: cycle time reduction, lowered inventory levels, productivity improvement, performance improvement, generate product differentiation, and facilitate business learning. The least important benefits fall in three categories as strategic, operational, and organizational.

The firm invested in both financial and human resources. Budget and human resources were controlled frequently. In case of additional investment, it was reported to the top management immediately. Both of the investments were mobile. Sometimes; one of the investment type was used instead of another. The most important support was hiring certain temporary employees who would replace the ones who had been charged with the ERP project. Temporary employees were trained by the employees whom they would replace.

In Table 2, barriers encountered in ERP project will be analyzed by using mean and standard deviations.

<b>Barriers</b>	<b>Mean</b>	<b>Std.Dev.</b>
Difficulties in changing to new from old systems	4,04	,539
Unavailability of skilled project people	3	,913
Turnover of key project people	2,28	1,137
High costs of implementation	3,44	,583
Difficulties in estimating project requirements	3,48	,714
Significant resistance from staff	3,44	,917
In house resource constraints	2,76	1,091
Unclear strategic direction and vision for the use of ERP	2,52	,918
Coordination between functional groups	3,08	1,038
Lack of commitment from top leadership	2,16	1,028
Incompetent consultants	2,64	1,114
Bugs in the software	2,92	1,038
Lack of discipline	2,52	,918
Lack of change management	2,8	,816
Inadequate Training	3	1,155
Poor Reporting Procedures	3,36	1,114
Lack of Process Engineering	3,08	,640
Poor Software Functionality	2,92	,812
Inadequate Ongoing Support	2,88	,881
Underperformed Project Team	2,48	,714

*Table 3: Perception of Barriers in ERP Projects*

Through the results of Table 3, the most important 5 barriers are as follows: difficulties in changing to new from old systems, difficulties in estimating project requirements, significant resistance from staff, high costs of implementation, and poor reporting procedures.

The least important 5 barriers are lack of commitment from top leadership, turnover of key project people, underperformed project team, unclear strategic direction and vision for the use of ERP and lack of discipline.

The barriers in this enterprise were almost the same as stated in the relevant literature. It was required for the employees to gain new skills and transfer of data was also an important barrier. During and after the project, there was no turnover of key project people. One of the most important reason for the difficulties is the first application of "best practices" in the sector. Bureaucracy in SAP applications and the difficulties of usage caused resistance from staff. The other barrier is related with the reporting procedures. The users wanted to use the same reports they used in the old system. Therefore, it took 1-2 months to prepare the same reports through an additional module named Business Warehouse.

Risks valid in ERP projects are explained in Table 3 by using means and standard deviations.

<i>Risks</i>	<i>Mean</i>	<i>Std.Dev.</i>
Cost escalation	3.2	.645
Retention of skilled people	2.84	.850
High degree of organizational change	3.48	.714
Lack of user acceptance	3.24	1.052
Incapability of infrastructure to contend with new technology	3.12	.971
Loss of control over software version migration	3.2	.913

*Table 4: Perception of Risks in ERP Projects*

In the organizational change program, all processes in the enterprise were changed. Accordingly, roles and responsibilities of employees changed. Change program was more effective in customer related processes. Requirements for organizational change were identified through a Web based software. In the Web based software, present responsibilities and required responsibilities are compared. Depending on the difference between present and required responsibilities, training requirements are identified. Web based software was very helpful.

#### **4.3.3. Test of Hypotheses**

Test of H1, H2, H3, H4 and H5 are explained below. Spearman correlations will be used since the data don't have normal distribution properties.

##### *Test of H1*

Through the results of Table 3, it can be concluded that some barriers are not valid for this ERP project. These barriers are: Turnover of key project people (Mean=2.28), in house resource constraints (Mean=2.76), unclear strategic direction and vision for the use of ERP (Mean=2.52), lack of commitment from top leadership (Mean=2.16), incompetent consultants (Mean=2.64), bugs in the software (Mean=2.92), lack of discipline (Mean=2.52), lack of change management (Mean=2.8), poor software functionality (Mean=2.92), inadequate ongoing support (Mean=2.88), underperformed project team (Mean=2.48) and unavailability of skilled project people (Mean =3).

Hence, only 8 barriers are correlated with benefits for this ERP project.

H1: The benefits of ERP projects are related with the barriers in ERP projects.

The most important barrier in the project is “Difficulties in changing from old to new systems”. This barrier is correlated with such benefits as “cost reduction” ( $r=.540, p<0.01$ ), “more efficient business processes” ( $r=.489, p<0.01$ ) and “faster, more accurate transactions” ( $r=.358, p<0.05$ ).

During transition to new systems, training caused employees to get aware of the differences caused by the new system and they thought that the processes would be more efficient and cost would reduce.

High implementation costs are correlated with financial flows control ( $r=.444, p<0.01$ ), better management and controlling functions ( $r=.388, p<0.01$ ), quickened information response time ( $p=.370, p<0.01$ ).

As stated in the literature, ERP projects are costly systems. The costs can be classified in two categories: 1) Only occurring once 2) Occurring every year. The cost items are described as: software, hardware, consultancy and the costs related with employees. Though implementation costs are high, employees think that benefits with new ERP software is facilitating control which is achieved with the integration.

The barrier “difficulties in estimating project requirements” is correlated with improved decision-making ( $r=.604, p<0.01$ ), faster, more accurate transactions ( $r=.584, p<0.05$ ), better management and controlling functions ( $r=.462, p<0.05$ ), improved interaction with customers ( $r=.413, p<0.01$ ), better coordination and cooperation between functions and different company departments ( $r=.365, p<0.05$ ), possible redesigning of ineffective business functions ( $r=.361, p<0.05$ ), financial flows control ( $r=.358, p<0.05$ ), information flows control ( $r=.353, p<0.05$ ).

As in all ERP projects, there were some barriers while trying to identify project requirements. The most important barrier for identifying project requirements was best practices. Though some difficulties were experienced, there were some important benefits gained.

The barrier “significant resistance from staff” is correlated with support business growth ( $r=.536, p<0.01$ ), generate product differentiation ( $r=-.413, p<0.05$ ), financial flows control ( $r=.406, p<0.05$ ), and quality improvement ( $r=-.397, p<0.05$ ).

In ERP projects, user acceptance of ERP software is a necessary requirement for achieving intended benefits. In this ERP project, resistance from staff is an important barrier for both strategic (support business growth and generate product differentiation) and quality improvement (operational) benefits. ERP system had some bureaucracy and was difficult to use compared to older system. These were the main reasons for staff resistance.

The barrier “coordination between functional groups” is correlated with “support organizational changes” ( $r=-.459, p<0.01$ ).

Organization change is required in ERP projects. As ERP requires a process-oriented enterprise, there should be a coordination among functional groups.

The barrier “inadequate training” is correlated with “better management monitoring and controlling functions” ( $r=.628, p<0.01$ ), quickened information response time ( $r=.470, p<0.05$ ), improved interaction with customers ( $r=.443, p<0.05$ ), faster, more accurate transactions ( $r=.396, p<0.05$ ) and information flows control ( $r=.383, p<0.05$ ).

ERP projects bring up new innovations for the enterprise so training is important for using all of the new features of the ERP system. Training was applied in two different stages. In the first stage, superusers were trained and they worked in the other branches in the other countries. Superusers were evaluated by their instructors and supported with respect to the result of the evaluations. The second stage of the training was related with the users. All of the users were trained related with the usage of new software, processes and every transaction they would use. Training was realized in 3 months after working hours. The time period for

the training should be longer. Training was effective mainly in controlling functions, and getting information in a shorter time.

### *Test of H2*

H2: Barriers in ERP projects are related with risks in ERP projects.

Through the results of Table 3, it can be concluded that some barriers are not valid for this ERP project. These barriers are: Turnover of key project people (Mean=2.28), in house resource constraints (Mean=2.76), unclear strategic direction and vision for the use of ERP (Mean=2.52), lack of commitment from top leadership (Mean=2.16), incompetent consultants (Mean=2.64), bugs in the software (Mean=2.92), lack of discipline (Mean=2.52), lack of change management (Mean=2.8), poor software functionality (Mean=2.92), inadequate ongoing support (Mean=2.88), underperformed project team (Mean=2.48) and unavailability of skilled project people (Mean =3). Therefore, these barriers are excluded from the analysis. Retention of skilled project people is not considered as a risk in this ERP project (Mean =2.84). Therefore, other 5 risks are correlated with 8 barriers in this analysis.

The risk “cost escalation” is caused by “difficulties in changing to new from old systems” ( $r=-.493$ ,  $p<0.01$ ).

While changing to ERP systems, there were both financial and human resource investments. Investments caused cost escalation.

ERP projects require organizational change. The details of organizational change should be planned and implemented in ERP project. In organizational change program, job descriptions of users may change which may result in user resistance. Therefore, high degree of organizational change is correlated with significant resistance from staff ( $r=.351$ ,  $p<0.05$ ).

The risk “lack of user acceptance” is valid for before ERP projects, during ERP projects and after ERP projects. Users may resist using ERP projects due to a number of reasons. The barriers in this research are: high costs of implementation ( $r=.575$ ,  $p<0.01$ ), significant resistance from staff ( $r=.425$ ,  $p<0.05$ ).

There were some strategies employed to minimize the user resistance. 1) Monthly bulletins were published and the developments in ERP project were explained to employees. 2) There were some posters explaining and motivating about ERP project around the firm. 3) There were also monthly meetings in which expectations from the users were explained and questions from the users were explained.

Upgrading of technology is a requirement for most of the ERP projects. It requires a heavy workload to determine the technology requirements of ERP projects. Therefore, the risk “incapability of infrastructure to contend with new technology” is correlated with difficulties in estimating project requirements ( $r=.358$ ,  $p<0.01$ ) and inadequate training ( $r=.348$ ,  $p<0.05$ ). Most of the enterprises are changing their systems to enterprise systems. So, they have to convert data to the new enterprise system or integrate some of their legacy systems with the new enterprise system.

The risk “loss of control over software version migration” occurs during ERP project implementation. “Loss of control over software version migration” is caused by difficulties in changing to new from old systems ( $r=-.461$ ,  $p<0.05$ ).

Without discipline and change management program, it is possible to lose control in software version migration.

*Test of H3:*

H3: Benefits are related with user satisfaction in ERP projects.

Benefits that provide user satisfaction are as follows: Better coordination and cooperation between functions and different company departments ( $r=.807$ ,  $p<0.01$ ), possible redesigning of ineffective business functions ( $r=.695$ ,  $p<0.01$ ), better resource management ( $r=.685$ ,  $p<0.01$ ), performance improvement ( $r=.661$ ,  $p<0.01$ ), productivity improvement ( $r=.606$ ,  $p<0.01$ ), better logistics ( $r=.593$ ,  $p<0.01$ ), more efficient business processes ( $r=.580$ ,  $p<0.01$ ), support business growth ( $r=.579$ ,  $p<0.01$ ), quality improvement ( $r=.568$ ,  $p<0.01$ ), cost reduction ( $r=.542$ ,  $p<0.01$ ), facilitate business learning ( $r=.532$ ,  $p<0.01$ ), control of flow of goods ( $r=.527$ ,  $p<0.01$ ), generate product differentiation ( $r=.521$ ,  $p<0.01$ ), build common visions ( $r=.469$ ,  $p<0.05$ ), lowered inventory levels ( $r=.410$ ,  $p<0.05$ ), improved interaction with suppliers ( $r=.404$ ,  $p<0.05$ ) and improved on-time delivery ( $r=.387$ ,  $p<0.05$ ).

17 of 30 benefits are correlated with user satisfaction.

*Test of H4:*

H4: Barriers are related with user satisfaction in ERP projects.

The only barrier correlated with user satisfaction in ERP projects is “difficulties in changing to new from old systems” is ( $r=.351$ ,  $p<0.05$ ). Achievement of an important requirement in ERP project will increase trust related with ERP project.

*Test of H5::*

H5: Risks are related with user satisfaction in ERP projects.

The two risks that are related with user satisfaction in ERP projects is “cost escalation” ( $r=-.529$ ,  $p<0.05$ ) and loss of control over software version migration ( $r=-.591$ ,  $p<0.05$ ).

**CONCLUSIONS**

Information systems are important drivers of competition in a highly globalized world. In the ERP literature, there is much discussion about ERP systems, benefits, risks or barriers encountered with ERP projects. ERP systems are costly and complex systems. Therefore, it requires heavy workload and attention to many factors during realization of ERP projects. It is widely known that ERP is not just a software application but it also changes the manner how the tasks are carried out. It is required to conduct postimplementation review for learning about the effects of ERP projects and gaining intended competitive advantage. This research was conducted in a branch of multinational enterprise aiming to adapt ERP in all of the branches. A questionnaire and indepth interview was used to assess the benefits, risks, barriers and user satisfaction in ERP project. Results were parallel with the suggestions in the relevant ERP literature. Some of the similarities can be summarized as: high degree of organizational change, need for top management support, difficulties in changing from old to new systems and the difficulties in estimating project requirements. Some differences are also worthwhile. Turnover of key project people were not realized in ERP project. As a result of the study, it can be concluded that benefits are effective in the realization of user satisfaction in ERP projects. The most important limitation of the research is conducting the research only in one firm.

## REFERENCES

- Abdinnour-Helm S., Lengnick-Hall M.L. and Lengnick-Hall C.A. 2003. 'Pre-implementation attitudes and organizational readiness for implementing an Enterprise Resource Planning system', *European Journal of Operational Research*, 146: 258-273.
- Adam F. and O'Doherty P. 2000. 'Lessons from enterprise resource planning implementation in Ireland – towards smaller and shorter projects', *Journal of Information Technology*, 15:305-316.
- Aladwani A.M. 2001. 'Change management strategies for successful ERP implementation', *Business Process Management Journal*, 7(3): 266-275.
- Al-Mashari M. 2003. 'A Process Change-Oriented Model for ERP Application', *International Journal of Human-Computer Interaction*, 16(1): 39-55.
- Al-Mashari M., Al-Mudimigh A. and Zairi M. 2003. 'Enterprise Resource Planning : A Taxonomy of Critical Factors', *European Journal of Operational Research*, 146: 352-364.
- Bendoly E. and Jacobs F.R. 2004. 'ERP architectural / operational alignment for order processing performance', *International Journal of Operations & Production Management*, 24(1): 99-117.
- Boersma K. and Kingma S. 2005. 'Developing a cultural perspective on ERP', *Business Process Management Journal*, 11(2): 123-136.
- Davenport T.H. 1998. 'Putting the Enterprise into Enterprise System', *Harvard Business Review*, July-August 1998.: 121-131.
- Genoulaz V.B. and Millet P.A. 2005. 'A classification for better use of ERP systems', *Computers in Industry*, 56:573-587.
- Hawking P., Stein A., and Foster S. 2004. 'Revisiting ERP Systems: Benefit Realization', *Proceedings of the 37th Hawaii International Conference on System Sciences*.
- Hirt S.G. and Swanson E.B. 1999. 'Adopting SAP at Siemens Power Corporation', *Journal of Information Technology*, 14: 243-251.
- Hirt S.G. and Swanson E.B. 2001. 'The maintenance implications of the customization of ERP software', *Journal of Software and Evolution: Research and Practice*, 13:415-419.
- Hitt L.M., Wu D.J. and Zhou X. 2002. 'Investment in Enterprise Resource Planning: Business Impact and Productivity Measures', *Journal of Management Information Systems*, 19(1): 71-98.
- Hong K.K., Kim Y.G. 2002. 'The critical success factors for ERP implementation an organizational fit perspective', *Information & Management*, 40: 25-40.
- Hsu L.L. and Chen M. 2004. 'Impacts of ERP systems on the integrated-interaction performance of manufacturing and marketing', *Industrial Management & Data Systems*, 104(1): 42-55.
- Hunton J.E., Lippincott B. And Reck J.L. 2003. 'Enterprise resource planning systems: Comparing firm performance of adopters and nonadopters', *International Journal of Accounting Information Systems*, 4: 165-184.
- Khawk K.Y. 2006. 'ERP Acceptance: Organizational Change Perspective', *Proceedings of the 39th Hawaii International Conference on System Sciences*.
- King S.F. and Burgess T.H. 2006. 'Beyond critical success factors: A dynamic model of enterprise system innovation', *International Journal of Information Management*, 26, 59-69.
- Kumar V., Maheshwari B. and Kumar U. 2002. 'ERP systems implementation: Best practices in Canadian government organizations', *Government Information Quarterly*, 19: 147-172.
- Kumar V., Maheshwari B. and Kumar U. 2003. 'An investigation of critical management issues in ERP implementation: empirical evidence from Canadian organizations', *Technovation*, 23: 793-807.
- Light B. 2005. 'Going beyond "misfit" as a reason for ERP package customization', *Computers in Industry*, 56:606-619.
- Luo W. and Strong D.M. 2004. 'A Framework for Evaluating ERP Implementation Choices', *IEEE Transactions on Engineering Management*, 51(3): 322-333.
- Martin I. and Cheung Y. 2005. 'Business process re-engineering pays after enterprise resource planning', *Business Process Management Journal*, 11(2):185-197.
- Murphy K. E. and Simon S.J. 2002. 'Intangible benefits valuation in ERP projects', *Information Systems Journal*, 12: 302-320.
- Newell S., Huang J.C., Galliers R.D. and Pan S.L. 2003. 'Implementing enterprise resource planning and knowledge management systems in tandem: fostering efficiency and innovation complementarity', *Information and Organization*, 13: 25-52.
- Olhager J. and Seldin E. 2003. 'Enterprise resource planning survey of Swedish manufacturing firms', *European Journal of Operational Research*, 146: 365-373.

- Oliver D. and Romm C. 2002. 'Justifying enterprise resource planning adoption', *Journal of Information Technology*, 17: 199-213.
- Parr A.N. and Shanks G. 2000. 'A Taxonomy of ERP Implementation Approaches', *Proceedings of the 33rd Hawaii International Conference on System Sciences*.
- Rajagopal P. 2002. 'An innovation – diffusion view of implementation of ERP systems and development of a research model', *Information & Management*, 40: 87-114.
- Rao S.S. 2000. 'Enterprise Resource Planning: Business Needs and Technologies', *Industrial Management & Data Systems*, 100(2): 81-88.
- Sammon D. and Adam F. 2004. 'Towards a model for evaluating organizational readiness for ERP and data warehousing projects', *Proceedings of the 12th European Conference on Information Systems*, Turku School of Economics and Business Administration, Turku, Finland.
- Sarkis J. and Gunasekaran A. 2003. 'Enterprise resource planning – modelling and analysis', *European Journal of Operational Research*, 146: 229-232.
- Scheer W. and Habermann F. 2000. 'Making ERP a success', *Communications of the ACM*, 43(4): 57-61.
- Soh C., Kien S.S. and Yap J. T. 2000. 'Cultural fits and Misfits: Is ERP a universal solution?', *Communications of the ACM*, 43(4):47-51.
- Somers T.M. and Nelson K.G. 2003. 'The impact of strategy and integration mechanisms on enterprise system value: Empirical evidence from manufacturing firms', *European Journal of Operational Reserach*, 146: 315-338.
- Sprott D. 2000. 'Componentizing the Enterprise Application Pacakages', *Communications of the ACM*, 43(4): 63-69.
- Sumner M. 2000. 'Risk factors in enterprise-wide ERP projects', *Journal of Information Technology*, 15: 317-327.
- Teltumbde A. 2000. 'A framework for evaluating ERP projects', *International Journal of Production Research*, 38(17): 4507-4520.
- Trott P. and Hoecht A. 2004. 'Enterprise Resource Planning and the Price of Efficiency: The Trade Off Between Business Efficiency and the Innovatice Capability of Firms', *Technology Analysis and Strategic Management*, 16(3): 367-379.
- Yang C.C., Ting P.H. and Wei C.C. 2006. 'A study of the factors impacting ERP System Performance – from the Users' Perspectives', *The Journal of American Academy of Business*, 8(2): 161-166.
- Zhang Z., Lee M.K.O., Huang P., Zhang L., and Huang X. 2005. 'A framework for ERP systems implementation success in China: An empirical study', *International Journal of Production Economics*, 98: 56-80.