

An Investigation of ERP Implementation Experiences in Finland

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This study reports on the ERP implementation experiences of 113 mid-sized Finnish companies. The success of the implementations is measured by two main variables: the time (for how long) and the budget (how much). The aim of the current paper is to identify the factors that are associated with the companies' capability to finish their ERP project on time and/or on budget. The data for the study was collected by the use of a 17 questions survey. The response rate was of 22%. The results show that the companies that managed to comply with the original budget and to complete the implementation on time, started the implementation process after the over budget and late adopting organizations. Furthermore, the implementation cost, and duration have a significant influence on the success of the adoption project while the top management support is perceived as a factor with weak significance on the success of the implementation.

Introduction

ERP systems started to be popular in the business environment in the mid-1990s. Once adopted within and across organizations, the ERP systems achieve the integration of such business functions as financials, sales and marketing, operations and logistics, and human resources. ERP systems are built upon a single database that enables modules to share data, thus speeding up the information flow within organizations.

Both in the business press and in the academic literature, ERP success stories competed closely with the failure stories. On the one hand, the ERP systems seem to reduce inventories, lower costs, and improve the supply-chain management

processes. On the other hand, the ERP investments are expensive, and the implementation process is intensive and takes long time. The ERP investment consists in purchasing the software, paying for the consulting services, the training, the system integration and the hardware. (Parr and Shanks, 2000)

In response to the abundant literature of examples of ERP project problems, a research stream has emerged that suggests a set of critical success factors that are related to how well companies cope with the adoption difficulties. For example, Nah and Lau (2001) and Zhang et al (2002) study the critical success factors for the ERP implementations, and both papers identify a common set of factors, such as top management support, effective

project management, business process reengineering, suitability of software and hardware, education and training, and user involvement.

- The top management support is included as a critical success factor based on the observation that in successful ERP implementations, the adoption decision is in general a top-down decision.
- ERP implementations are intricate projects that need effective project management to plan, coordinate and control the related activities.
- Another determining factor is to establish to what extent the company needs to reengineer its current business processes in order to comply with the ERP software.
- Suitability of software and hardware factor refers to the fact that the management must make a careful choice of an ERP package that best matches the legacy systems, meaning the hardware platform, databases and operating systems.
- Participating in the system development and implementation, the users go through a transition period that gives them time to understand better the project consequences.
- Education and training becomes important when the ERP system is up and running, and the users should be capable to use it, hence they should be aware of the ERP logic and concepts, and should be familiar with the system features.

In addition, researchers carried on survey-based investigations aimed at building up a picture of the state-of-the-art of ERP practice and implementations. For example, in Europe, Van Everdingen et al (2000) performed a survey-based research on 2647 companies in order to identify the degree of ERP penetration, and the reasons for selecting a specific ERP software vendor. One of the results of the study was that 27% of the mid-sized firms had an ERP software implemented. In Finland, for example, there was a degree of penetration of circa 20%. The same study suggested that by the end of 2000, there will be a degree of penetration of ERP on the Western European market of 75%, with a higher expected penetration rate in Finland.

Out of the total 151 companies that responded to my survey, 75% had an ERP system implemented by November 2004. One should bear in mind that this percentage may be biased by the non responding companies.

Studies in 1998 reported that over 90% of the ERP implementations were late or over budget, and some have even ended in failure (Parr and Shanks, 2000). This study is performed at a time when the diffusion of innovation has been taking place and companies have learned how to successfully implement an ERP system. The current findings show that most of the responding firms have been able to complete the

implementation project on time and on budget.

Mabert et al (2001) study the factors that may influence the business returns of an ERP investment. The business returns are dependent on whether the ERP implementation is managed successfully, hence the importance of a closer assessment of the success of ERP adoptions.

Research Objective

The research objective of the study is to investigate the ERP implementation experiences in Finnish companies and to identify the elements that are associated with the success of the ERP adoptions.

Methodology

The current empirical study is built upon the data gathered from a survey distributed to 676 Finnish organizations. I started the selection of the sample by applying the following filters in the VOITTO database for the Finnish companies and financial statements:

1. The company should be the parent company.
2. The company should be active.
3. The number of employees should be greater or equal to 50.

The firms belonging to the baking, insurance and leasing industries are taken out from the sample, so the

initial sample size was of 676 companies.

The questionnaire was divided in two major parts: one part that aims at collecting data regarding the ERP success measures, such as time, budget, and the system functionality, and the second part that sought to identify the respondents' perception on the importance of the most critical success factors for the ERP implementation process. The questionnaire did not include questions for the identification of the company.

The questionnaire was mailed to a total of 676 companies based in Finland. Out of the 676 companies, 365 received the same questionnaire by email as well. The target respondents group was the CFO at the respective companies. For 286 companies, the questionnaire was sent both to the CFO and to the CIO.

By the beginning of November 2004, the survey accompanied by a cover letter and a postage-paid return envelope was submitted to the 676 selected companies, and by the beginning of January 2005, 151 responses were obtained. Out of all the 151 responses, there were 113 ERP adopters, and 38 non-adopters. The response rate of 21% would have been higher if the survey had been sent in a different period. November and December are the closing months when the finance people have other more pressing priorities. Nevertheless, the response rate was considered satisfactory.

Descriptive Data Concerning The Sample Companies

Out of the 151 respondents, 12% respondents had the CIO position, and the rest of 82% had the CFO position.

The companies come from different business sectors. As one can observe from *Table 1.1*, 41,9% of the companies belongs to the Industry sector, 19,9% of the companies are active in the Services sector, followed closely by 19,1% of the companies in the Wholesale sector.

Industry	57	41,9
Production of base materials	4	2,9
Retail trade	2	1,5
Services	27	19,9
Transport, logistics	5	3,7
Wholesale	26	19,1
Total	136	100,0

The company size is measured both by the number of employees and by the annual sales volume. As one can observe from *Figure 1.1* and *1.2*, the company size ranges from companies having 50 to 90 employees and 1 to 2 million Euros sales to companies having more than 1000 employees, and sales of more than 200 million Euros.

Table 1.1

Industry sector	Frequency	Percent
Communication and publishing	1	0,7
Construction	8	5,9
Education and healthcare	1	0,7
Energy	3	2,2
Hotel and Restaurant	2	1,5

According to the data in *Table 1.2*, 37,8% of the companies have employees between 100 and 249 and a sales volume between 20 and 100 million Euros, and 22,4% have employees between 50 and 99. 19,4% have a sales volume between 10 and 20 million Euros.

Table 1.2

Employee groups	Frequency	Percent	Sales groups (millions euros)	Frequency	Percent
(50-99)	22	22,4	(1-2)	1	1,0
(100-249)	37	37,8	(2-10)	17	17,3
(250-499)	18	18,4	(10-20)	19	19,4
(500-999)	9	9,2	(20-100)	37	37,8
(more than 1000)	12	12,2	(100-200)	10	10,2
			(more than 200)	14	14,3

Figure 1.1
The distribution of the sample companies according to employees number

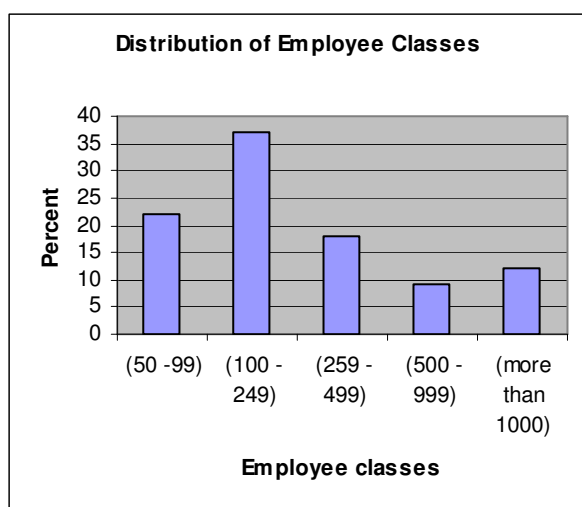
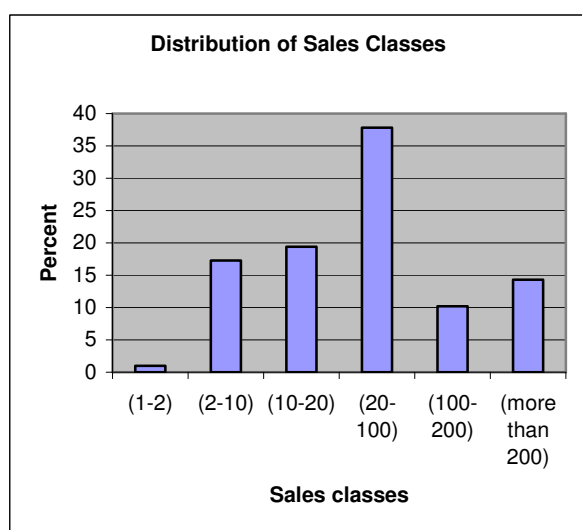


Figure 1.2
The distribution of the sample companies based on the annual sales volume



One of the survey questions consisted in identifying what type of ERP package the company is using. Most of the respondents, 85%, use the modules of a single vendor's ERP package, while 5% of the respondents indicated that their company is using modules of different vendors' ERP packages.

37,9% of the ERP packages was purchased from domestic ERP vendors, such as Wintime (TietoEnator) that was implemented by 6% of the responding firms, and Liinos 6 (Visma Software) that was used by 5,1% of the firms in the sample. 55,1% of the ERP packages was purchased from international ERP vendors, SAP R/3 being used by 23,1% of the responding companies (Table 1.3). Other pieces of ERP software used are Sonet (WM-Data Novo, 6%), ASW (IBS, 6%), LEAN Systems (TietoEnator 3,4%), IFS (IFS Finland 3,4%), Axapta (MBS 2,6%). (Table 1.4)

Table 1.3

ERP vendor	Frequency	Percent
Domestic	44	37,9
International	64	55,1
Not identified	9	7
Total	117	100,0

Table 1.4

ERP software	Frequency	Percent
SAP R/3	27	23,1
Sonet	7	6,0
Wintime	7	6,0
ASW	6	5,1
Liinos 6	6	5,1
Own system	5	4,3
IFS	4	3,4
LEAN Systems	4	3,4
Axapta	3	2,6
Scala	3	2,6
Sentera	3	2,6
Solagem	3	2,6
ACE	2	1,7

Efekto	2	1,7
Maestro	2	1,7
Movex	2	1,7
Nova	2	1,7
Pupesoft	2	1,7
Tehotek	2	1,7
Työkalupakki	2	1,7
Visio3	2	1,7
Baan IV	1	0,9
Concorde Xal	1	0,9
Different solut	1	0,9
EMCE	1	0,9
Esdata	1	0,9
ERP software	Frequency	Percent
I-Mandis	1	0,9
Inreo Dealflow	1	0,9
Jeeves Enterpri	1	0,9
Jydacom	1	0,9
Mavis400	1	0,9
Meritt	1	0,9
MFG	1	0,9
Misco	1	0,9
Oracle Financials	1	0,9
PARM	1	0,9
PDS	1	0,9
PRMS	1	0,9
RamBase	1	0,9
Tietonovo	1	0,9
Tikon	1	0,9
Winplan	1	0,9
Total	117	100,0

The ERP Implementation Experience

According to O’Leary (2000), companies decide to go for an ERP solution due to fours reasons:

1. The technology reason – for some companies, the ERP adoption was seen as a solution to the Y2K problem.

2. The business reason – the ERP systems are expected to entail increase in efficiency and productivity.

3. The competitive reason – the competitors have already the system, and the decision to go for an ERP is seen as a decision to stay in business.

4. The strategic reason – the ERP system is believed to improve the customer service.

Nevertheless, in the literature there have been reported many examples of ERP projects that have failed.

This is what it makes the ERP implementation experiences to be worthwhile to be analysed and to reveal possible key variables that have an impact on the success or failure of an ERP adoption.

In the survey there are included questions related to the timeliness of the project, to the compliance with the budget, and to the system functionality. The answers to the respective questions enable the construction of three success measures for the success of the ERP implementations: the time measure, the budget measure, and the functionality measure.

Furthermore, the survey includes questions strictly related to the ERP implementation experience: the number of modules implemented, the implementation duration, the single/multiple ERP package use, the implementation cost, the perception on the importance of the critical

success factors for the adoption process.

The time success measure

The responses point to the fact that on average, the sample companies managed to complete the implementation project within the initial deadline. Most of the companies (79,5%) are on time adopters. However, 20,5% of the responses show that the adoption was completed more than 6 months after the initial deadline, which means that the respective companies are late adopters.

The following elements – specific to the adopting company or to the selected ERP software - may explain why some companies succeed in completing the implementation project

within the initial timeframe, while others do not. (*Table 1.5*):

1. The ERP implementation aspects: the number of modules implemented, the implementation duration, the implementation cost.
2. The perception on the importance of the critical success factors in the ERP implementation project. The most important critical success factors that are tested in this survey are: top management support, effective project management, BPR, Suitability of Software and Hardware, Education and Training, and User Involvement.
3. The innovation diffusion aspect: the proxy for this element is the number of years during which the company has utilized an ERP software – the ERP life.

Table 1.5

Variables	On time adopters (79,5%)	Late adopters (20,5%)	P-value (2-tailed)
Average number of modules implemented	5,8553	7,5294	0,268
Average implementation duration	10,9063	21,2609	0,000
Average implementation cost	1292147	342727,3	0,022
Average perception on top management support	4,4024	4,2609	0,527
Average perception on effective project management	4,0778	3,6957	0,161
Average perception on BPR	3,8289	3,4286	0,180
Average perception on Suitability of Software and Hardware	4,2444	4,3043	0,835
Average perception on	4,0222	4,000	0,930

Education and Training			
Average perception on User Involvement	4,2111	4,000	0,389
Average ERP life	4,9534	4,6667	0,792

An independent samples t-test was conducted to compare the average number of modules implemented by the on-time adopters (mean=5,8553) with the average number of modules implemented by the late adopters (mean=7,5294). The late adopters seem to implement a higher number of modules than the on time adopters, but there was found **no significant** difference (p value=0,268). This result confirms Mabert et al. (2003) results obtained from a sample of US manufacturing companies.

If the on-time firms implement on average, almost 6 modules, with two less than the late adopters, at the same time, the former group completes the implementation project in almost 10 months, a shorter period of time than the late adopters. The mean difference in the implementation duration has a high **statistical significance** at a p-value=0,000.

By comparing the average implementation cost of the on-time companies (1.292.147) with the average implementation cost of the late companies (342.727,3), one can observe that the on-time groups spend almost four times more during the implementation project. The t test shows a **statistical significance** of the mean difference in cost between the two groups (p-value=0.022). This implies that the implementation cost is

a key variable for the time performance of the project.

An independent samples t-test was conducted to investigate the difference in the perception of the on-time and late adopters on the importance of top management support for the ERP adoption project. The result showed **no significant** difference between the mean perceived value by the on-time adopters (4.4024) and the mean perceived value by the late adopters (4.2609) (p-value=0.527) although the former group has a slightly higher perception. The same independent-samples t-test is conducted on the difference in the mean perception on effective project management between on-time and late adopters. The results show that the perception on the importance of the effective project management between the on time adopters (4.0778) and the late adopters (3.6957) does not differ significantly (p-value=0.161). The perception on the importance on business process reengineering is on average slightly higher for the on-time adopters group (3.8289) than for the late adopters (3.4286). However the difference has no statistical significance (p-value=0.180). The perception on the suitability of software and hardware is rated higher by the late adopters (4.3043) than by the on time adopters (4.2444), but still without any statistical significance (0.835).

The perceptions on the importance on education and training and user involvement are rated higher by the on-time adopters (4.0222 and respectively 4.2111) than the late adopters (4 and respectively 4), but there is no statistical significance in the difference of the mean perceived values (p -value=0.930 and p -value=0.389 respectively).

The business functions of the on-time and late adopters have been supported by an ERP system for about the same period of time, 4 and half years. Considering that the implementation duration is twice shorter in the case of on-time adopters, one may argue that the on-time adopters managed better the resources that collaborated to the identification of the good procedures and to the avoidance of the implementation traps.

The data show that the factors that have a significant correlation with the time measure are the implementation cost and the implementation duration of the project. The on-time companies spend on average 4 times more than the late companies, even though when it comes to the company size, both the on-time adopters and the late adopters have on average about the same annual sales, between 10 and 20 millions euros.

Other factors, such as the number of modules implemented, and the perception on the importance of the critical success factors for the ERP implementations, did not prove to have any statistical significance.

The budget measure

Another way of establishing whether an ERP adoption was successful or not is to assess the budget performance of the project. In other words, to analyse whether the company managed to finish the implementation on budget or if the company did not comply with the initial established budget.

The relationship between the time measure and the budget measure was investigated using the Pearson product-moment correlation coefficient. There was a medium, significant positive correlation between the two variables ($r=0.298$, $n=112$, $p=0.001$), which means that a better time performance of the ERP implementation project is associated with a better budget performance of the project.

As in the previous section, I am going to test a range of variables that may have an influence on the completion within budget of the ERP implementation:

1. ERP implementation aspects: the number of modules implemented, the implementation time, the lateness of the project, the implementation cost.
2. The importance that the companies assign to the critical success factors for an ERP implementation.
3. The innovation diffusion aspect: the ERP life.

First, based on one of the survey questions, I divide the firms into two

groups: on budget and over budget adopters.

Second, an independent samples t-test was conducted to investigate the statistical significance of the influence of the above-mentioned factors on the budget performance of the projects. The results of the test are presented in *Table 1.6*.

61% of the respondents considered that their ERP project was completed on budget, 34% responded that the ERP adoption incurred higher costs than initially estimated, whereas 5% did not want to comment the budget issue.

Table 1.6

Variables	On budget group (61%)	Over budget group (34%)	P-value (2-tailed)
Average number of modules implemented	6,1094	7,1333	0,301
Average implementation time	13,08	14,04	0,663
Average lateness of the project	-1,8551	-4,9459	0,014
<i>Average implementation cost</i>	<i>1374380</i>	<i>592157,1</i>	<i>0,115</i>
<i>Average perception on top management support</i>	<i>4,4348</i>	<i>4,0811</i>	<i>0,100</i>
Average perception on effective project management	4,0580	3,7368	0,217
Average perception on BPR	3,8406	3,5263	0,223
Variables	On budget group (61%)	Over budget group (34%)	P-value (2-tailed)
Average perception on the Suitability of Software and Hardware	4,2609	4,0789	0,470
Average perception on Education and Training	3,9565	3,9737	0,942
Average perception on User Involvement	4,2609	3,8947	0,129
ERP life	4,3333	5,0833	0,248

The data in *Table 1.6* shows that the over budget group has an average of 7 modules implemented in comparison

with the average of 6 modules implemented by the on budget group,

but the difference in mean is not significant (p -value=0.301).

The average number of months that an ERP adoption takes for an on budget firm is of 13 months, with one month less than the average number of months that takes for an over budget firm of 14 months. The mean difference is not significant, the p -value being 0.663.

The on budget firms are on average 2 months later than the initial established schedule while the over budget firms are on average 5 months later. The mean difference in the lateness of the project between the on budget and over budget firms is highly **significant** at a level of 0.014. The high significance is not surprising considering that between the time and budget measures it was found a positive significant correlation ($r=0.298$, $n=112$, $p=0.001$).

Although the on budget companies finish on time the implementation project, they run implementation costs twice more than the over budget companies. The mean difference in the implementation cost has a low statistical significance at a level 0,115.

The perception on the importance of top management support for the success of the ERP implementation is higher rated by the on budget companies (4.4348) than by the over budget companies (4.0811). The mean difference has nearly statistical significance (p -value=0.1). The perception on the importance of all the other critical success factors - the

effective project management, the business process engineering, the suitability of software and hardware, and the user involvement - is also rated higher (mean=4.0580, 3.8406, 4.2069, 4.2609) by the on budget adopters than by the late adopters (mean=3.7368, 3.5263, 4.0789, 3.8947). The mean differences have no statistical significance ($p=0.217$, 0.223, 0.470). There is an exception regarding the perception on the importance of education and training where the on budget companies have a lower rated perception of 3.9565 than the 3.9737 rated perception of the over budget firms. Nevertheless, the mean difference is not significant, the p -value=0.942.

On average, the on budget adopters have been using an ERP system for 4 years whereas the over budget adopters have been using an ERP package for 5 years. The one-year mean difference in the ERP life for the two groups has not significant value (p -value=0.248). However, these results match Mabert et al (2001) results that the over budget firms started their implementation at least one year earlier than the on budget firms. Furthermore, I share Mabert et al (2001) opinion that under the circumstances, the on budget companies have benefited from the previous implementation experiences of the over budget adopters by finding out the best practices.

The functionality measure

The functionality measure incorporates three dimensions:

1. The functionality of the modules – if the established modules were implemented and function as expected.
2. The system use – if all the users utilize the system as they have been trained to do it.
3. The attainment of the business case – if the measurement elements established at the outset of the project have been reached in order to predict whether ERP will be beneficial or not.

When starting an ERP project the companies establish what modules to implement and what is the desired functionality for each module. 20,4% of the respondents considered that the ERP modules did not fulfil their initial functionality whereas 73,5% of the respondents was satisfied with the functionality of the adopted modules. (see *Table 1.7*)

Table 1.7

Perception on ERP functionality	Percent	Cumulative Percent
Very weak	0,9	0,9
Weak	5,3	6,2
Neutral	14,2	20,4
Strong	49,6	69,9
Very strong	23,9	93,8
N/A	6,2	100,0

It is likely that the perception on the system functionality is influenced by the fact that the companies managed or not to complete the project on time and/or on budget.

Thus, the relationship between the perceived functionality of the ERP system and the success of the implementation measured by the on time/late variable was investigated using Pearson product-moment correlation coefficient. As one can observe in *Table 1.8*, there was a small, positive correlation between the perception on the systems functionality and the lateness of the project ($r=0.237$, $n=113$, $p=0.013$), with high levels of perceived functionality associated with shorter lateness of the project.

Table 1.8

		Lateness
Perception functionality	Pearson Correlation	0,237(*)
	Sig. (2-tailed)	0,012
	N	112

* Correlation is significant at the 0.05 level (2-tailed).

The more time passes by and the company makes time-consuming modifications to the purchased ERP modules, the higher the frustration with a system that fails to meet the expectations.

The data in *Table 1.9*, points to a small, positive correlation between the perception on the systems functionality and the budget performance of the project ($r=0.264$, $n=113$, $p=0.005$), with high levels of perceived functionality associated with high budget performance. In other words, the companies that have complied with the original budget have

a higher perception on the functionality of the system.

Table 1.9

		Perception functionality
On/over budget	Pearson Correlation	0,264(**)
	Sig. (2-tailed)	0,005
	N	113

** Correlation is significant at the 0.01 level (2-tailed).

In order to bring along the expected promises, ERP systems should be used appropriately and the future users should utilize the system in accordance with the training provided after the installation of the ERP software. 76.1% of the respondents considered that the system is successfully used, while 4.4% was not satisfied with the way the system is being used. (*Table 1.10*).

Table 1.10

Perception on ERP successful use	Percent	Cumulative Percent
Very Weak	0,9	0,9
Weak	3,5	4,4
Neutral	11,5	15,9
Strong	45,1	61,1
Very strong	31,0	92,0
N/A	8,0	100,0

Data in *Table 1.11* and *1.12* show a low but significant positive relationship between the perceived successful usage of the system and the time and budget performance of the system. The higher the time and budget performance of

the system, the more the respondents consider that the system is successfully used.

Table 1.11

		Successful use
On time/late adopters	Pearson Correlation	0,197(*)
	Sig. (2- tailed)	0,037
	N	112

* Correlation is significant at the 0.05 level (2-tailed).

Table 1.12

		Successful use
On/over budget adopters	Pearson Correlation	0,237(*)
	Sig. (2-tailed)	0,011
	N	113

* Correlation is significant at the 0.05 level (2-tailed).

The third measure of the systems functionality is the perception on the realization of the business case. As one can see in *Table 1.3*, 62.8% of the respondents consider that the business elements included in the business case reached the expected levels, whereas 31% considered that their business case was not fully realized.

Table 1.13

Realization of business case	Percent	Cumulative Percent
Very Weak	0,18	1,8
Weak	3,5	5,3
Neutral	25,7	31,0
Strong	46,0	77,0
Very strong	16,8	93,8
N/A	6,2	100,0

The results of the Pearson product-moment correlation coefficient point to a significant positive relationship both between the perceived realization of the business case and time performance of the project ($r=0.193$, $n=113$, $p=0.041$) and between the perceived realization of the business case and budget performance of the project ($r=0.348$, $n=113$, $p=0.000$). This supports the hypothesis that the higher the time and budget performance of the implementation project, the higher the perception on the realization of the business case (Table 1.14 and Table 1.15).

Table 1.14

		Business case realization
Ontime / late adopters	Pearson Correlation	0,193(*)
	Sig. (2-tailed)	0,041
	N	112

* Correlation is significant at the 0.05 level (2-tailed).

Table 1.15

		Business case realization
On/over budget adopters	Pearson Correlation	0,348(**)
	Sig. (2-tailed)	0,000
	N	113

** Correlation is significant at the 0.01 level (2-tailed).

Therefore, there is a positive relationship between the functionality measure and the time measure and respectively budget measure.

Conclusions

The purpose of the current paper was to suggest a set of factors that are associated with the success of the ERP implementation process. The implementation success was measured from three perspectives: the time perspective, the budget perspective, and the functionality perspective.

The survey results show that most of the respondents completed the implementation process on time (79.5%), and on budget (61%), and the system reached the expected functionality (70.8).

Both the on time and late adopters have on average a similar company size, but the on time adopters spent four times more than the late adopters during the implementation process. The difference in the implementation cost seems to have a significant influence on whether the firm meets the time target. There was also a significant difference in the

implementation time between the on time and late adopters. Considering that the average ERP life for both groups is of 4 years and half, I conclude that the late adopters started the first the implementation process but finished the adoption at about the same time with the on time adopters.

The on budget group contains companies that are slightly larger than the firms belonging to the over budget group. The average implementation cost is more than twice higher for the on budget organizations than for the over budget firms, which may mean that the former group makes more realistic estimates about the size of its implementation expenditures.

Furthermore, the interpretation of the data points to a significant difference in the average lateness of the project between the on budget organization and the over budget ones. The on budget adopters are on average 2 months later whereas the over budget adopters are 5 months later than initially scheduled.

The average ERP life for the on budget adopters is of 4 years as compared to 5 years of ERP usage by the over budget adopters. The average implementation time for the on budget implementers is of 13 months, with one month shorter than the implementation time for the over budget adopters. These results point to the fact that the over budget adopters are the ones that started the implementation first.

Therefore, the over budget and late adopters started the adoption process

before the on budget and on-time adopters. This finding leads to the same interpretation as the one made by Mabert et al (2001). The implementation experiences of the former group of companies have provided to the latter group a valuable knowledge concerning the best implementation practices and the mistakes that are to be avoided.

Concerning the perception on the importance of critical success factors for the ERP adoption project, there were not significant differences in the perception between the on time/on budget firms and late/over budget firms, although on average, the former group rated higher the role of the success factors. It was an exception though in the perception on the top management support between the on budget and over budget adopters. The mean difference between the perception on top management support of on budget adopters and the perception on top management support of over budget adopters is nearly significant. It may be argued that the involvement of top management in the implementation process helps in making a better budget estimate.

The final interesting finding consists in the significant correlation between the system functionality measures and the time/budget measures. This results are consistent with Mabert et al (2001) results: the firms that complete the project on time and on budget have a higher perception on the system functionality (modules functionality, successful use, business case

attainment) than the organizations that are late and over budget.

Overall, the study suggests that the implementation cost and the implementation duration are highly associated with the time and budget performance of the ERP implementation project. The perception on the importance of the critical success factors such as effective project management, business process reengineering, suitability of software and hardware, education and training and user involvement, was not found to have any significant influence on the success measures. The perceived importance of the top management support was weakly associated with the budget performance measure.

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