

STRUCTURE OF ERP TOTAL COST OF IMPLEMENTATION

ŠTRUKTÚRA CELKOVÝCH NÁKLADOV NA IMPLEMENTÁCIU ERP SYSTÉMOV

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1. INTRODUCTION

The enterprise resource planning (ERP) system is an integrated set of programs that provides support for core business processes, such as production, input and output logistics, finance and accounting, sales and marketing, and human resources. An ERP system helps different parts of an organization to share data, information and, hopefully, also knowledge, to reduce costs, and to improve management of business processes (Aladwani, 2001). Wier, Hunton and HassabElnaby (2007) argue that ERP systems aim to integrate business processes and ICT into a synchronized suite of procedures, applications and metrics which go over firms' boundaries. Figure 1 illustrates an ERP system life-cycle.

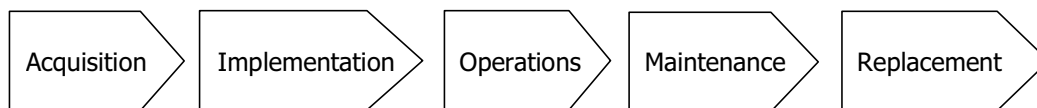


Figure 1 ERP system life-cycle

A current review of all 17 Web of Science articles discussing ERP system selection criteria uncovered that nine (Ayağ and Özdemir, 2007; Bueno and Salmeron, 2008; Fisher, Fisher, Kiang et al., 2004; Keil and Tiwana, 2006; Lall and Teyarachakul, 2006; Rao, 2000; Umble, Haft and Umble, 2003; Wei, Chien and Wang, 2005; Yang, Wu and Tsai, 2007) of these seventeen articles mention price (using terms, such as cost, cost of ownership, total costs, system cost, software costs, price affordability, average cost of packages, estimated cost of implementation) as an ERP selection criterion. Moreover, this is the highest percentage of all criteria mentioned in these articles.

ERP system implementation is probably the most laborious and the most expensive part of the ERP life-cycle. Companies usually have a good idea about how much they are expected to pay in license fees but lack a more precise understanding of additional costs related to implementation. According to Bingi, Sharma and Godla (1999), even though the price of prewritten software is cheap compared with in-house development, the total cost of implementation could be three to five times the purchase price of the software. Therefore, the article provides a percentual structure of total cost of implementation (TCI) from end-users' point of view. According to Bingi, Sharma and Godla (1999), the cost of hiring consultants and all that goes with it can consume up to 30 percent of the overall budget for the implementation. The implementation costs would increase as the degree of customization increases. A review of existing literature on ERPs such as (Shehab, Sharp, Supramaniam and Spedding, 2004), (Esteves and Pastor, 2001) and (Botta-Genoulaz, Millet and Grabot, 2005),

shows that the main problem is the misfit between ERP functionality and business requirements. This also supports the need for customization.

TCI is, for purpose of this article, split into the following four drivers: software license, programming of changes, organizational implementation, and hardware costs. The phrase “programming of changes” is used instead of the term “customization” because in SAP terminology “customization” means “parameterization”, i.e. modifying the ERP system through settings, not through a modified/added code. Therefore, the term “customization” will not be used in the text from now on. The division is compatible with Gartner structure, which divides costs into (a) personnel (including programming of changes, organizational implementation) and (b) non-personnel (including software and hardware costs).

ERP systems used to be a domain of large companies but there is a still increasing number of small and middle enterprises adopting adopt them as well. There are some reasons for this trend, including a saturation of the market, as most large organizations have already implemented an ERP system, increasing possibilities and need for the integration of systems between organizations and the availability of relatively inexpensive hardware (Gable and Stewart, 1999). Therefore the article discusses impact of company size on individual parts of ERP system TCI. Besides company size, influence of formal information strategy and representation of the IT department on the board level on TCI drivers is analyzed.

2. DATA AND METHODOLOGY

The research presented in the article is based on a questionnaire survey. The survey was conducted in May and June 2007. Questionnaire forms accompanied by cover letters were mailed to randomly selected companies. The list of addresses and information about the number of employees were retrieved from Statistical Bureaus of the Slovak Republic. Regarding the sample 600 questionnaires were sent to small, 300 to medium enterprises, and 300 to large companies. The number of questionnaires mailed to small companies was double the number of medium and large companies because small companies constitute the highest proportion of companies and based on our personal experience, they are less likely to respond. In total, there were 112 responses, 49 of them replied to all questions needed for the analysis presented in this article.

Dependent variables are software license, programming of changes, organizational implementation, and hardware costs. These TCI drivers are measured in percent.

Independent variables are company size, turnover growth, representation of the IT department on the board level and information strategy. Analyzed are small, middle and large companies, where companies from 10 to 49 employees are considered to be small enterprises, companies from 50 to 249 employees are considers to be middle enterprises, and companies with 250+ employees are considered to be large enterprises. Information strategy stands for formal information strategy and representation of the IT department on the board level means that there is a chief information officer (CIO) or alike director for IT. Data on turnover growth were also gathered but the variable is not used because it would decrease the sample size from 49 to 44.

Analysis of variance (ANOVA) is used to test impact of independent variables on dependent variables; a multivariate approach is used and results are commented on confidence level $\alpha = 0,05$. Tukey-Kramer multiple-comparison test is used to identify between what instances of an independent variable there are significant differences.

In addition to that, t-test is used to test whether software costs fall within one fifth and one third of TCI and whether organizational implementation is less or equal to 30% as both facts were suggested in Bingi, Sharma and Godla (1999).

The article does not investigate ERP outsourcing; it looks into in-house implementation only. Bergkvist and Johansson (2007) discuss the outsourcing in greater detail.

3. EMPIRICAL RESULTS

Individual TCI drivers are analyzed by ANOVA in this chapter. ANOVA outcomes of software license are presented in Table 1, of programming of changes in Table 2, of organizational implementation in Table 3, and of hardware costs in Table 4.

Table 1 Software license

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	P-value
Company Size	2	3599,661	1799,831	3,70	0,032730*
Information Strategy	1	0,607213	0,607213	0,00	0,971977
CIO	1	1359,941	1359,941	2,80	0,101636
S	44	21406,12	486,5027		
Total (Adjusted)	48	26188,2			
Total	49				

* Term significant at alpha = 0,05

Percentage of TCI spent for software license depends on company size. According to Tukey-Kramer multiple-comparison test, there is a significant difference between middle and large companies.

Table 2 Programming of changes

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	P-value
Company Size	2	66,60755	33,30378	0,08	0,924507
Information Strategy	1	52,51777	52,51777	0,12	0,726415
CIO	1	271,2275	271,2275	0,64	0,427864
S	44	18635,11	423,5252		
Total (Adjusted)	48	19033,67			
Total	49				

There was no significant factor influencing percentage of TCI spend for programming of changes identified in Table 2.

Table 3 Organizational implementation

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	P-value
Company Size	2	1579,602	789,8009	3,80	0,030048*
Information Strategy	1	125,5309	125,5309	0,60	0,441250
CIO	1	484,2767	484,2767	2,33	0,134078
S	44	9146,053	207,8648		
Total (Adjusted)	48	10990			
Total	49				

* Term significant at alpha = 0,05

Percentage of TCI spent for organizational implementation depends on company size. There are significant differences in standard deviations for different company sizes.

Table 4 Hardware costs

Source Term	DF	Sum of Squares	Mean Square	F-Ratio	P-value
Company Size	2	263,706	131,853	0,36	0,697073
Information Strategy	1	48,34194	48,34194	0,13	0,716685
CIO	1	1036,829	1036,829	2,86	0,097819
S	44	15945,21	362,3911		
Total (Adjusted)	48	17322,98			
Total	49				

There was no significant factor influencing percentage of TCI spend for hardware costs identified in Table 4.

Table 5 offers actual percentages in a framework based on the ANOVA results.

Table 5 ERP System TCI Structure (in %)

TCI drivers	Company size		Medium		Large	
	Small	SD	Mean	SD	Mean	SD
Software license	47,25	28,95	56,25	19,23	35,00	19,84
Programming of changes	19,00	24,59	15,63	16,35	19,79	19,27
Organizational implementation	10,00	14,14	8,13	5,94	19,69	16,08
Hardware costs	23,75	20,46	20,00	15,81	25,17	19,64

Legend: SD = standard deviation

T-test is used to test if percentage of software license on TCI in small, medium, and large companies is higher than 1/3 (i.e. also than 1/5) as suggested by Bingi, Sharma and Godla (1999). The percentage is not significantly different from 1/3 in small (p-value = 0,330) nor large companies (p-value = 0,654). But the percentage is a significantly different from 1/3 in medium companies (p-value = 0,012). Normality of data could not be rejected.

Percentage of organizational implementation on TCI is less than 30%, so there is no deviation from the figure suggested in Bingi, Sharma and Godla (1999).

4. CONCLUSION

Although off-the-shelf concept of ERP systems might imply that software license is the only implementation cost, according to Bingi, Sharma and Godla (1999), the actual cost of implementation can be three to five times the price of software license. Besides software license, the research conducted in Slovak companies has looked into programming of changes, organizational implementation, and hardware costs. It has been found that software costs in middle companies are significantly more than 1/3 that Bingi, Sharma and Godla (1999) suggested. Other company sizes conformed to the estimate. It also holds for organizational implementation, which was about 15%, i.e. within the limits suggested by Bingi, Sharma and Godla (1999). Programming of changes is about 19% and hardware costs are about 24% of ERP system TCI. It may be concluded that organizational implementation outweighs software costs, since their sum is constant throughout all company sizes.

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ABSTRACT

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Enterprise resource planning (ERP) systems implementation is probably the most laborious and the most expensive part of the ERP system life-cycle. The article provides a percentual structure of total cost of implementation (TCI) from end-users' point of view. It should be of interest to companies planning to implement ERP systems, since literature suggests that TCI can be 3-5 times higher than the software license alone. TCI is, for purpose of this article, split into the following four drivers: software license, programming of changes, organizational implementation, and hardware costs. Impact of company size, existence of formal information strategy, and representation of the IT department on the board level on individual parts of TCI is analyzed.

KEYWORDS: ERP systems, implementation process, empirical research

ABSTRAKT

Implementácia ERP systémov predstavuje v súčasnosti najzložitejšiu a často i finančne najnáročnejšiu časť životného cyklu ERP systémov v organizácii. Príspevok poskytuje prehľad štruktúry nákladov na implementáciu ERP systémov z pohľadu koncového užívateľa. Záujmom firiem by malo byť dôkladné plánovanie implementácie ERP systémov, nakoľko skúsenosti ukazujú, že celkové náklady na implementáciu ERP systémov môžu byť v priemere 3 až 5 krát vyššie ako náklady na kúpu samotnej licencie. Celkové náklady na implementáciu ERP systémov chápeme pre účely tohto článku nasledovne: softvérová licencia, programovanie zmien, organizačné náklady spojené s implementáciou a náklady na hardvér. Predmetom analýzy poskytnutej v príspevku je vplyv veľkosti podniku na štruktúru celkových nákladov implementácie ERP systémov, existencia informačnej stratégie, ako aj podiel IT oddelenia na jednotlivých položkách celkových nákladov na implementáciu systémov ERP.

KEÚČOVÉ SLOVÁ: ERP systémy, proces implementácie, empirický výskum

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