

ERP System Total Cost of Implementation in Slovak and Slovenian Companies

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Abstract

Enterprise resource planning (ERP) system implementation is probably the most laborious and rather costly part of the ERP system life-cycle. The paper provides a percentage structure of total cost of implementation (TCI) from end-user company's perspective. 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 paper, split into the following four parts: software license, programming of changes, organizational implementation, 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 (SMEs) adopting them as well. Based on research done in Slovenia and Slovakia, the impact of the different company size, the country, existence of formal information strategy, representation of the IT department on the board level, and turnover growth on individual parts of TCI is analyzed and findings are discussed.

Keywords: Enterprise Resource Planning (ERP) Systems, Total Cost of Implementation, Empirical Research

1. Introduction

In order to be more efficient and effective, many companies rely on extensive use of IT to support business processes within the company and with their business partners. Companies often install enterprise resource planning (ERP) systems to integrate and fasten their business processes, [54] The 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 to reduce costs, and to improve management of business processes [1]. According to Wier, Hunton, and HassabElnaby [75], ERP systems aim to integrate business processes and ICT into a synchronized suite of procedures, applications and metrics which goes over firms' boundaries.

The introduction of an ERP is known to be a costly (and timely) undertaking. [54], [33], [62] A current review of Web of Science articles discussing ERP system selection criteria uncovered that price in the broad meaning of the word (cost, cost of ownership, total costs, system cost, software costs,

price affordability, average cost of packages, estimated cost of implementation) is the most frequently mentioned ERP system selection criterion (e.g. in [4], [14], [23], [37], [40], [61], [69], [74], [82]).

Companies usually have more or less clear estimations about how much they are expected to pay in license fees but often lack a more precise understanding of additional costs related to implementation. Total cost of implementation (TCI) can easily be three to five times the purchase price, depends of the system implementation complexity.

The paper discusses a percentage of TCI structure from end-user company's point of view. The results are presented based on the results of research survey conducted in two young European countries, Slovakia and Slovenia¹. Further in the paper total cost of implementation is described. This is followed by research methodology, research results and further on with conclusions.

2. Total Cost of Implementation

Although total cost of implementation, as a term, is discussed less often in relation to ERP systems than total cost of ownership², it is possible to estimate TCI easier and more precise than total cost of ownership, since costs arise in a relatively short period of time.

The most obvious part of TCI are license fees but according to [8], even though the price of prewritten software is cheaper compared with in-house development, TCI could be three to five times the purchase price of the software. According to [8], the

¹ The two countries used to be socialist till 1989, both of them split from the federations they used to belong to but they differ in other dimensions. In 2007, Slovakia had a population of 5,448 mil. and Slovenia of 2,009 mil. inhabitants. Gross domestic product per hour in 2007 EKS\$ was 27,90 in Slovakia and 32,53 in Slovenia. According to The Networked Readiness Index 2006–2007 rankings [76], Slovakia was the 41st with a score of 4,15, and Slovenia the 30th with a score of 4,41.

² 16 hits for keywords "total cost of implementation" and "enterprise resource planning" versus 1050 hits for keywords "total cost of ownership" and "enterprise resource planning" at Google Scholar as of 21 August, 2008

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 [10], [21] and, [65] shows that the main problem is the misfit between ERP functionality and business requirements. This also supports the need for customization.

These two estimates come from 1999. The authors of [8] have not published any newer estimates. Since it would be better to have a more recent estimate at hand, authors have looked into articles, which cited this one. The rationale was that if somebody conducted a TCI survey, they might refer to [8] in their references. The article [8] was, according to EBSCO, cited 49 times in Business Source Complete database. But investigating 42 articles [2], [3], [5], [6], [9], [12], [13], [15], [16], [18], [19], [20], [24], [26], [28], [29], [30], [31], [32], [36], [42], [43], [44], [51], [52], [55], [56], [57], [58], [59], [60], [63], [66], [67], [71], [72], [73], [77], [78], [79], [83], [84] and 7 abstracts [35], [39], [41], [45], [46], [53], [68] brought up two additional estimates. Firstly, the estimate in [36] citing [64] that “consultants are most often used as implementation partners at two to ten times the cost of the ERP software for the initial implementation”. The cited article was published in 2000 (i.e. shortly after [8]), and in our opinion, the interval is too wide, so it was not used for testing. Secondly, [19] cites [48], which provides the following estimates in Table 1.

Table 1: ERP System TCI Structure (in %) published in [48]

Cost Category	Mean
Consulting	30
Hardware/Infrastructure	25
Implementation Team	15
Training	15
Software	15

The percentages in Table 1 are from 2001, so 12 EBSCO articles [7], [11], [17], [27], [34], [38], [47], [49] (only abstract), [50], [70], [80], and [81], was checked which cited [48]. But none of them contained any estimates.

TCI is, for purpose of this paper, split into the following four parts: 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 in this paper the term “programming of changes” is used.

ERP systems used to be a domain of large companies but there is still an increasing number of small and middle enterprises adopting 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 [25]. During last years, also more and more ERP systems are available for SMEs, provided either by local providers and/or by providers that were primarily orientated to larger organizations. Thus the paper discusses impact of company size on individual parts of ERP system TCI.

Besides company size, influence of the country, existence of formal information strategy, representation of the IT department on the board level and turnover growth on individual parts of TCI is discussed.

3. Data and Methodology

The questionnaire research was conducted in May and June 2007. Questionnaire forms accompanied by cover letters were mailed to randomly selected companies in Slovakia and Slovenia. Lists of addresses and information about the number of employees were retrieved from respective Statistical Bureaus in Slovakia and Slovenia. In each country, 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 prior experiences, SMEs are less likely to respond. In total, there were 202 responses (112 from Slovakia, and 90 from Slovenia); 88 of them (44 from Slovakia, and 44 from Slovenia) replied to all questions needed for the analysis presented in this paper.

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

Independent variables are country, company size, turnover growth, representation of the IT department on the board level and information strategy. The questionnaire research was conducted in Slovakia and Slovenia. 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 considered to be middle enterprises, and companies with 250+ employees are considered to be large enterprises. This classification is compatible with [22]. Turnover growth over the years 2004-2006 is divided into five categories: reduction in turnover, stable turnover,

turnover growth of 0-5%, turnover growth of 5-10%, and turnover growth of more than 10%. 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. Figure 1 presents the structure of total cost of ERP implementation.

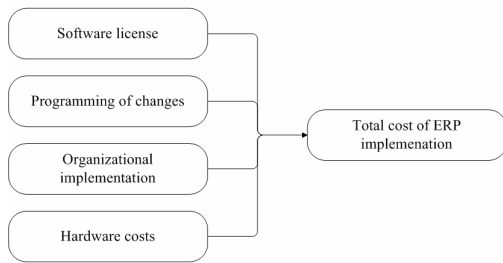


Fig 1. Total cost of ERP implementation structure

Analysis of variance (ANOVA) is used to test impact of independent variables on dependent variables; a multivariate approach is used. In addition to that, t-test is used to test whether software costs are 15%, as suggested in [48], or fall within one fifth and one third of TCI, as suggested in [8], whether organizational implementation is less or equal 30%, as suggested in [8], and whether hardware costs equal to 25%, as suggested in [48]. Results are commented on confidence level $\alpha = 0,05$.

4. Research Results

The analysis of ANOVA was conducted with collected data on percentage of software license, programming of changes, organizational implementation, and hardware costs on ERP system TCI.

Percentage of software license on TCI depends on the country (p-value = 0,038), it is higher in Slovakia than in Slovenia. Impact of the remaining independent variable was not found significant (p-values were higher than 0,16).

There was no significant relationship found that would influence percentage of programming of changes on TCI (p-values were higher than 0,37).

Percentage of organizational implementation on TCI depends on the country (p-value = 0,023), it is lower in Slovakia then in Slovenia. Impact of the remaining independent variable was not found significant (p-values were higher than 0,26).

Percentage of hardware costs on TCI depends on representation of the IT department on the board level (p-value = 0,011), it is higher in companies with CIO. Impact of the remaining independent

variable was not found significant (p-values were higher than 0,34).

Table 2 presents actual percentages in a framework based on the ANOVA results.

Table 2: ERP System TCI Structure (in%)

Cost Category		Slovakia		Slovenia	
		Mean	SD	Mean	SD
Software license		43,23	23,79	34,93	21,33
Programming of changes		19,05	20,44	20,8	15,88
Organizational implementation		14,48	15,09	21,32	19,31
Hardware costs	CIO	28,09	20,91	26,67	18,58
	w/o CIO	17,95	15,6	18,65	10,91

Legend: SD – standard deviation

Percentage of software license on TCI in Slovakia is higher than 1/3 (i.e. also than 1/5) and there is a significant difference between measured 43,23% and 1/3 suggested in [8] (p-value = 0,008), so it can be concluded that the estimate provided in [8] does not hold for Slovakia. Also percentage of software license on TCI in Slovenia is higher than 1/3 (i.e. also than 1/5) but there is no significant difference between measured 34,93% and 1/3 suggested in [8] (p-value = 0,622). In both cases, normality of data could not be rejected. Slovakia's deviation from the estimate and Slovenia's compliance with the estimate provided in [8] can be explained by higher Slovenia's development both in general terms (higher gross domestic product per hour) and higher IT maturity (higher score of networked readiness).

There is a significant difference between 15%, which was suggested in [48], and the actual percentage spent on software license in Slovakia and Slovenia.

Percentage of organizational implementation on TCI is less than 30% in both countries, so there is no deviation from the figure suggested in [8].

No significant difference in hardware is found between 25%, which was suggested in [48] and companies without information strategy. But there is a significant difference between 25% and the percentage of TCI spent on hardware in companies with formally defined information strategy.

The probable reason is that CIOs plan hardware for future (so they are sure that they will not need to upgrade it in the near future), while companies without CIOs try to increase return on investment by minimizing investments into hardware.

6. Conclusions

Although off-the-shelf concept of ERP systems might imply that software license is the only implementation cost, according to [8], the actual cost of implementation can be three to five times the price of software license. Besides software license, the research conducted in Slovak and Slovenian companies has looked into programming of changes, organizational implementation, and hardware costs. While Slovenian companies fit into the interval suggested in [8] for software license, the percentage in Slovak companies was significantly higher. The estimate in [48] does not hold for either country. It seems that the higher software license in Slovakia is outweighed by lower organizational implementation. Programming of changes is about 20% of ERP system TCI in both countries. When it comes to hardware costs, it seems that companies with representation of the IT department on the board level spend almost 10 percentage points more. The percentage suggested in [48] holds only for hardware in companies without information strategy.

The probable reason for difference in hardware costs may be explained by CIOs planning hardware for future. It is expected that companies with formally defined position of CIO would invest more in ICT infrastructure, considering the future needs and developments. On the other hand companies without CIOs might be trying to increase return on investment by minimizing investments into hardware.

It is quite surprising that no relationship in ERP system TCI structure was found between SMEs and large companies. One would expect that because of the scope of their operations, structure could differ. Especially since SMEs are relatively new to ERP systems market. But on the other hand also SMEs implement ERP systems appropriate to their size, nature and level of business processes complexity, what could be one of the explanations.

8. References

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