BUSINESS VALUE OF INFORMATION TECHNOLOGY IN SMALL AND MEDIUM SIZED COMPANIES

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Abstract

Organizations that obtain the maximum benefit from their IT investments recognize that, today, most IT investments involve not just technology but business change as well. They are really business investments with a technology component. Success with IT value management starts with joint accountability between IT and business managers. However, the majority appear to be using standard financial measures such as ROI, net present value (NPV), internal rate of return (IRR), or similar metric. While this is certainly an improvement over not measuring anything, exclusively using financial measures has serious flaws. A number of IT value methodologies that were developed during the past few years and employed in actual IT investment analysis such as the Business Value Index (BVI), Total Economic Impact (TEI), Val IT and Applied Information Economics (AIE). All four methodologies provide a set of tools to help organizations more accurately predict returns from their IT investments and overcome many of the weaknesses in using simple financial metrics. Measuring the value of IT-enabled business change will be critical to almost every organization as technology becomes embedded in virtually every business process. The most important IT tool in companies is the integrated information systems including the standard ERP, hardware, communication networks and the human resources as users. The selection and implementation of ERPs are very important and long term decision making. Supporting the evaluation of ERP in its life cycles decision tools were developed by our research work. These tools are the Services assisting pre-selection (ERP-Select), Decision supporting tool capable of evaluating ERP (ERP-Compare), Decision supporting tool (ERP-Eco) developed for the evaluation of economic value of ERP.

Keywords: ERP evaluation, ERP selection, decision system for evaluation

1. INTRODUCTION

Business value is the benefit for business units and the enterprise as a whole, represented in money terms, that is a result of IT solutions or services. The academic community has been divided for years on whether IT provides business value. In 2001 Intel developed the IT Business Value Programme and they used for years (SWARD, 2006). The improvements in information technology and information systems decrease the cost of activities and make activities more efficiently. These technologies improve the monitoring and coordination capabilities of organisations (HENDERSHOTT, 2006). In recent years, researchers have shown the connection between IT and productivity. The small business sector's - about 14 million firms in Western Europe - IT budget below to the medium business sector. AMR Research states that the Eastern European is an attractive target for IT firms seeking customers and for product firms seeking suppliers too. National product of the countries of the region is growing twice as fast as the EU average. Unfortunately, the East European countries are more affected by the economic crisis, which stops or sets back the recent growth rate.

In the Western European countries the ERP introduction has increased markedly between 1998 and 2000. This trend is expected repetition in the East European countries. Today, the companies invest significant resources to implement the ERP systems. When the system is adopt and works, the principal question is how is it possible to measure the effectiveness. By

contrast, expectations are follows. The 85% of companies believe that an ERP implementation is a more than 5 years planned investment. 70% believe that in total cost of ERP investment return on 25% and 50% of companies did not even try any return calculation (BOTTA-GENOULAZ-MILLET, 2005).

2. SURVEY ON ERP IN SMES

For our research, we needed some information from the companies, who used or intended to adopt an ERP system. This information was applied in process of decision system development. The investigation was mostly based on a survey with the following objectives:

- How the suitable computerized information system is, would be or was identified,
- What the most important factors are in choosing an ERP system,
- To what extent it is characteristic for SMEs to introduce integrated or standalone systems,
- How important the individual modules are, what modules are used and what modules are envisaged in the future,
- What advantages and disadvantages the information system implemented brought for the company,
- What amount the company was, is or would be willing to spend on implementing an ERP system or the maintenance of the system implemented,
- Whether the different subsidies available influence company decisions,
- Where, in what areas, the returns from the system, implemented are considered to be suitable for measuring.

The processing of the response to the question attempting to assess the ways computerised information systems were selected showed an interesting picture (Figure 1).
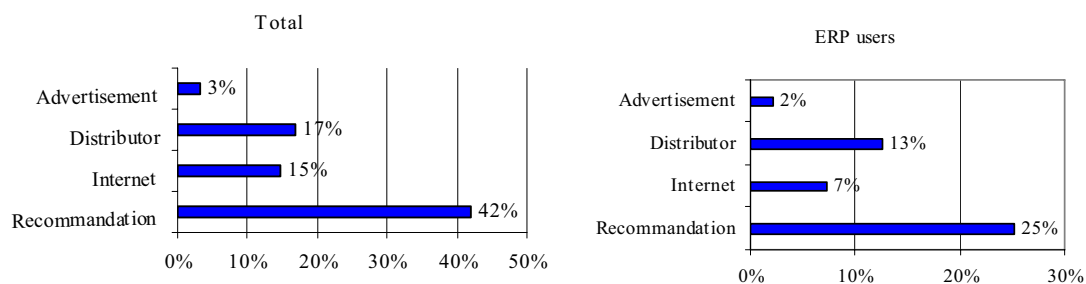

Figure 1: Ways for selecting ERP systems

Most businesses chose or would choose ERP systems on the bases of recommendations. It is surprising, however, that there were very few respondents who – based on their own statements – would also check the recommendation on the Internet.

A next question concerned the importance attached to certain factors in choosing ERP systems.

Figure 2: "Extremely important" factors influencing the choice

The respondents attached crucial importance to the price of the program (26%), the goodwill / reputation of the company supplying the program (25%) and the recommendation of the person interested in the activities of the company (23%) (Figure 2).

If, on the basis of the survey, the task were to choose the most important advantages that can be realised by implementing ERP then the most important advantage would be that following the implementation, obtaining information required less time and expenses. Faster flow of information also won a good place together with business procedures being more easily traceable and increased efficiency (Figure 3).
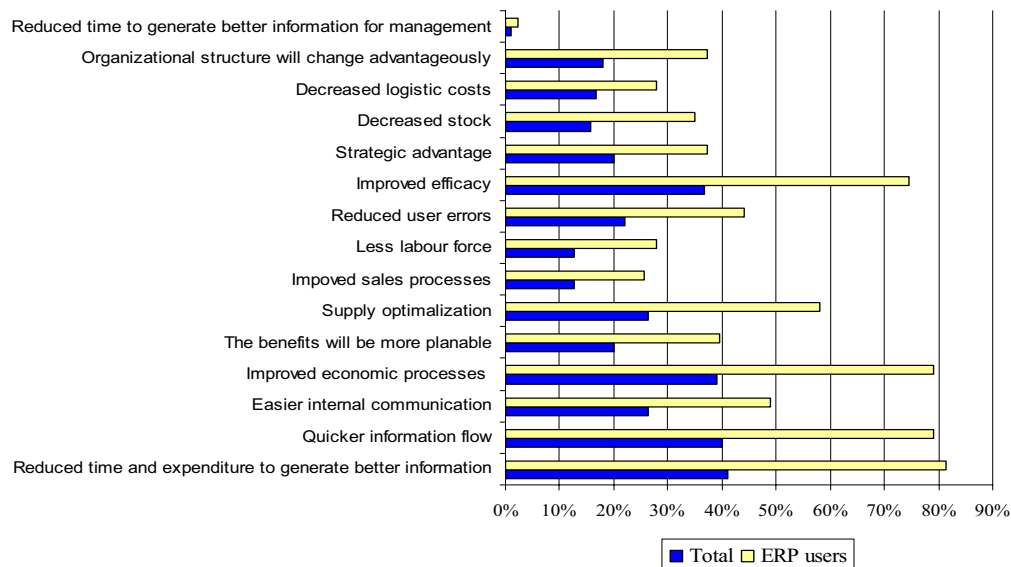

Figure 3: Advantages of the implementation of ERP

On the basis of the survey conducted in SMEs it has been concluded that

- Most enterprises choose or would choose ERP systems on the basis of recommendations. Recommandations of the persons interested in ventures have more priority in decision.
- In making the section it is the price of the program and the name of the developer/distributor that are the most important selection considerations
- The four most frequently used modules are: sales, inventory management, finances, general ledger.

- Ventures see, feel and experience the drawbacks of implementing ERP too.
- From the point of view of this research the question, as to where, in what business areas the return of ERP investments can be measured, is important. On the basis of the responses the following order can be established: time efficiency, strategies advantage.

3. MAIN EVALUATION METHODS

3.1. TCO (Total Cost of Ownership)

One of the simplest indicator and at the same time the one that influences business executives to a great extent is what is called TCO (Total Cost of Ownership). Total cost ownership means the total ownership costs of an informatics investment. The TCO indicator includes all the costs that were incurred by investing in and maintaining the equipment during its useful lifetime at the business beginning from the ones related to preparing the decision.

3.2. Public ROI (Public Return on Investment)

This methodology was developed by the Center for Technology in Government at the University of New York with the assistance of SAP. Making efforts at integrating economic processes is one of the primary efforts a business will make. Arranging the economic processes into a system may be one of the consequences of an IT supported investment. The ROI indicator, which is suitable for measuring effectiveness and economic efficiency, is considered by business executives to be one of the most important elements in decision-making even in our days. The ROI i.e. the indicator of the return on investment is the most frequently used indicator in IT investments. It shows what percentage of the invested capital is constituted by the "profit" resulting from the investment. The integration of processes is a complex issue for the evaluation of which a number of factors are to be taken into consideration in founding a decision. Investments can be evaluated by making use of different ROI indicators. We can also speak of general ROI (ROI), arithmetic ROI (ROI_{arit}) and logarithmic ROI (ROI_{log}).

3.3. Net present value

In analysing and evaluating an investment one of the most frequently used indicators is net present value, NPV.

It is calculated as follows:

$$NPV = -C_0 + \sum_{i=1}^{n} \frac{C_i}{(1+r)^i},$$

where

C_0 - means the capital invested in order to realise the investment,
C_i - means the net cash flow for period i as a result of the investment,
r - means the discount rate,
n - means the analysed service life of the investment.

The cash flow for a given period can be calculated as follows:

$$C_i = B_i - K_i,$$

where

B_i – is the total of the incomes over period i,
K_i – is the total of the expenses for period i.

In calculating the NPV the incomes realised and the expenses incurred can be taken into account. The registration of an event in the accounting system can be used in calculating the NVP only after the correction has been made.

4. DECISION SYSTEM FOR SELECTION, COMPARISON AND ECONOMIC EVALUATION

4.1. ERPselect

The service is free up to the point of making the recommendations but the comparison of the systems is a fee-charging service.
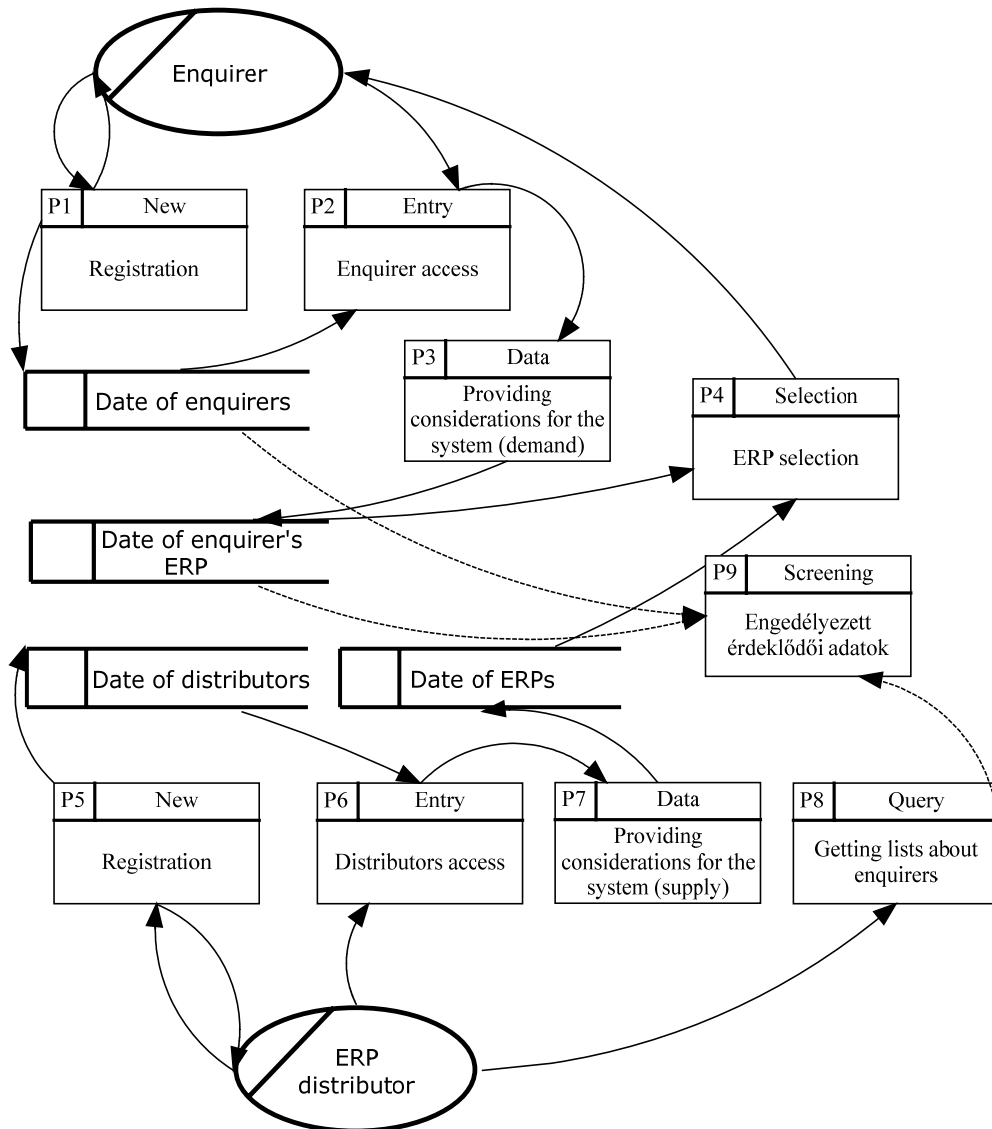

Figure 4: A sketch for thedataflow-chart of the application assisting selection

As part of my own research a plan for an application supporting pre-selection was prepared for small and medium sized enterprises, the demo version of which was also implemented. The primary obstacle to making the service publicly available was that only few companies selling ERP solutions that had been invited to participate filled in the questionnaire, which would have formed the primary basis for selection. These questionnaires were also sent out in

an electronic form. There are hopes that supported by some marketing activities there will be opportunities in the future to create the necessary database.

The sketch for the data flows of the ERP$_{Select}$ service are illustrated in Figure 4.

At present the demo version stores the necessary data in four databases:

- Databases storing user data
    - o Data of people making enquiries (people looking for something)
    - o Data of those offering ERP solutions (suppliers)
- Databases linked to ERP systems
    - o The database storing the system requirements of those looking for ERP systems
    - o The database storing the data of the ERP systems on offer.

The basis for the selection process is consists of a well-defined system of different criteria. As regards the ERP$_{Select}$ processes there are three different functions to be identified:

- Providing user data, registration (both supply and demand sides)
- Providing the considerations for the system (both supply and demand sides)
- Doing the selection, information on the results.

From the point of view of the interested person, the person trying to find ERP solutions, the ERP$_{Select}$ operates in the following way:

- Registration and entry
- Giving the criteria in ten steps.

After the data have been given the ERP$_{Select}$ selects the solutions that are the most favourable for the enquirer from the ERP database.

The involvement of ERP distributors is considered to be important in order that our database containing ERP systems and businesses selling ERP systems have as current information as possible and so be able to help small and medium sized businesses with more up-to-date information with making their choices as regards selecting systems for themselves.

4.2.   ERPcompare

The basis for the multifactoral evaluating system is the creation of some multidimensional system of considerations or criteria, which in turn will give the basis for evaluating the system. the advantage of the system is that factors that are hard to quantify can also be included in the selection process or the evaluation, while its disadvantage is that there are no standards available for creating the system of criteria, these may change individually and the expertise of several specialists is necessary for comparing them.

It is practical to include the considerations into several groups.

- Exclusive considerations: basic requirements
- Listing considerations: desirable characteristics.

When compiling the system of considerations one can rely on well-known methodologies like Euromethod ISO/IEC 9126. In conformity with the system of considerations the quantifiable weight of each consideration also has to be defined. With the help of the preference matrices established by comparing pairs or groups of the evaluation considerations individual weighed systems of considerations can be given, with the help of which the satisfactory decision

regarding the investment can be made. The method is remarkably useful in analysing implemented investments as well.

In the course of conducting this research the multifactoral evaluation model for small and medium sized enterprises published in his doctoral thesis by P. Michelberger in 2004 was also amended. The decision supporting tool developed in this research is suitable for comparing two potential ERP projects. The model was given the nickname $ERP_{Compare}$ referring to the fact that here we speak of an evaluation system supporting the selection of ERP systems.

When the model was developed the evaluation considerations were arranged according to hierarchical subordination. On this basis the model includes main considerations, considerations and sub-considerations. Within the model itself there are three main considerations differentiated, namely:

- User main consideration
- Economic main consideration
- Main consideration related to the evaluation of suppliers.

All the three main considerations were further divided into considerations, which again were divided further and sub-considerations evolved. For the purposes of a comparative evaluation a model should have the following data (these cells are indicated against a white background in the model):

- Weighing level I belongs to the main consideration. The total value must be 100%.
- Weighing level II belongs to the considerations given at the second level of hierarchy.
- There are weighs belonging to the considerations given at the third level of hierarchy.
- Score requirement means the minimum number of points required in connection with any system. Values have to be given only for the third level of hierarchy as the points pertaining to considerations and main considerations are calculated by the program itself.
- Max. Score means the maximum number of points belonging to the individual considerations. Values have to be given only for the third level of hierarchy as the points pertaining to higher levels are calculated on the basis of these inputs.
- Scores belonging to projects A and B. Values have to be given for the third level of hierarchy only.

It is to be noted here that scores can be ordered to the individual projects if some previous information or knowledge have been obtained regarding the given system and the suppliers. It follows from this that the $ERP_{Compare}$ resource can only be used in the second phase of selection. The model can be supplemented at any time by including new considerations or projects if one should use it to evaluate several solutions.

Figure 9 contains a diagram which illustrates the considerations pertaining to user main considerations in the case of an A and a B project. The evaluation remains simple as long as either one of the two projects is dominant. Looking at considerations "Supplier undertakings following system implementation" and "Functionality" in Figure 9 the question as to which consideration is worth more can be asked. The evaluation according to sub-considerations may be helpful in making this decision.
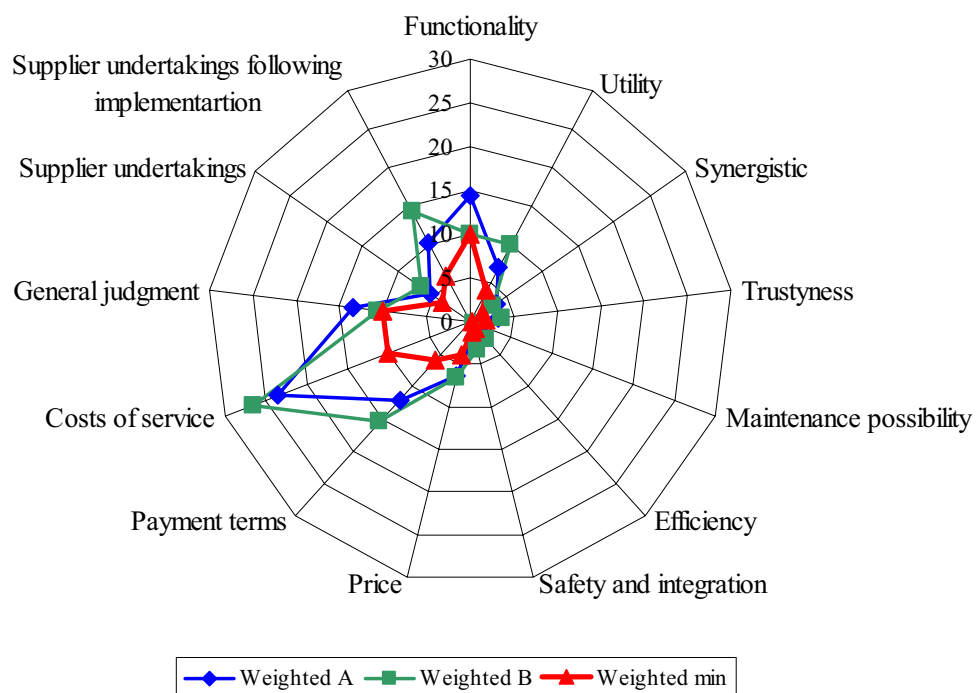
Figure 5: Evaluation according to user main considerations in the ERP$_{Compare}$ model

By applying ERP$_{Compare}$ the sequencing of the potential solutions can be attained, which in turn helps with making selection decisions. Another practical use is that before this investment is made potential ERP suppliers can be asked to compile their tender proposals according to these considerations and so conducting the evaluation work will become easier later in the decision-making phase.

4.3.   ERPeco

For those wishing to implement the ERP system, for the businesses dealing in it and also for the purposes of the analyses to be conducted within the framework of this research a calculator system was developed, in which an ERP system implemented can be evaluated according to the evaluation processes, methods and indicators mentioned in the previous points. This calculator system was named ERP$_{Eco}$, which refers to the economic evaluation as its main function. The ERP$_{Eco}$ does calculations for a period of up to ten years. It consists of the following modules:

- Title page
- Description page
- Licence calculator
- Costs
- Benefits
- Summary
- Financial analysis
- Diagrams

The licence module contains the most important functions included in a module system. If the proposals are made according to these modules, the calculator can be easily used to make decisions concerning implementations or even to evaluate the effects of later extensions.

The ERP$_{Eco}$ operates by using certain basic financial data, such as:

- Expected returns
- Discount rate
- Average tax bracket.

An important step in the evaluation of ERP systems is the thematic collection of the data necessary to calculate the indicators. Two important groups were defined in this respect:

- Expense
- Earnings.

Expenses mean all the economic activities linked to paying out any sums of money that may be related to the ERP investment. The definition of the earnings is a little bit more complex. Any incomes and savings directly or indirectly related to the introduction of the ERP system are listed here.

ROI- direct and indirect	**202%**
ROI (direct)	**148%**
NPV (direct and indirect)	**66 876**
NPV (direct)	**69 603**
Payback period	**<3**
Avarage anual TCO	**5 917**
Discounted avarage anual TCO	**5 550**
10-years IRR	**76%**
TCO	**59 174**

Figure 6: The financial indicators are computed (in a case study)

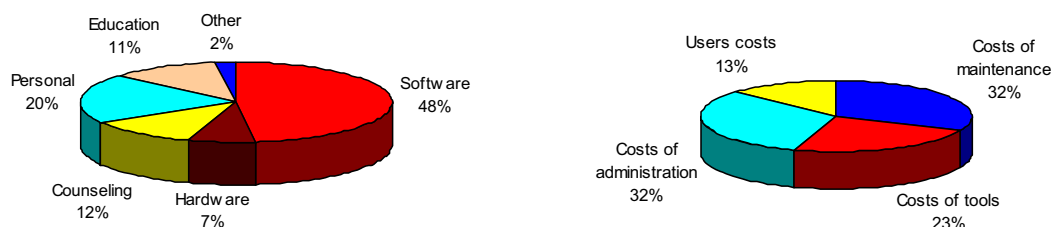| TCO	59 174	Total cost	59 174
Costs of maintenance	18 660	Software	28 480
Costs of tools	13 867	Hardware	4 047
Costs of administration	18 712	Counseling	6 992
Users costs	7 935	Personal	11 720
		Education	6 685
		Other	1 250

Figure 7: The TCO and the distribution of the total expenses (in a case study)

After the Expenses and earning have been quantified the necessary values are totalled in the module "sum total" and the preset calculable indicator figures are computed (Figure 6).

The indicator TCO is illustrated in the module 'diagrams' together with the distribution of earnings, the distribution of the total expenses (Figure 7), a comparison between the expected and the realised results and the trend in net present values at different discount rates.

5. CONCLUSION

Most enterprises choose or would choose ERP systems on the basis of recommendations. Recommendations of the persons interested in ventures have more priority in decision. In making the section it is the price of the program and the name of the developer/distributor that are the most important selection considerations. The four most frequently used modules are: sales, inventory management, finances, general ledger. Ventures see, feel and experience the drawbacks of implementing ERP too. From the point of view of this research the question, as to where, in what business areas the return of ERP investments can be measured, is important. On the basis of the responses the following order can be established: time efficiency, strategies advantage. The developed tools and system could be useful for SMEs in selection ERP, improving their business processes.

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