Proposal of a Compact IT Value Assessment Method

Przemysław Lech
Faculty of Management, University of Gdańsk, Poland
Przemyslaw.Lech@lst.com.pl

Abstract: This paper contains a proposal of a compact IT value assessment method. It follows the assumption that most methods available for the public are either described in a very general manner or concentrate on one of the evaluation aspects only. The proposed method relates the evaluation approach to the main IT initiative characteristics, such as the investment purpose and IT element to be implemented. Based on these criteria, the evaluation process is shaped by putting emphasis on the relevant evaluation aspects and choosing the relevant evaluation methods. The method design is focused on the ease of use and practical relevance so it can be used by IT practitioners to assess IT initiatives in their organisations. The paper finishes with the case study of the method usage in a mid-sized production enterprise.

Keywords: IT value assessment, IT evaluation, practical method, case study

1. Introduction

Although a large number of IT value assessment methods is available (Renkema and Berghout 1997), still, many enterprises do not use any structured evaluation approach while judging their IT investments (Love and Irani 2004) and if they do, the selection of methods is often limited to the simple cost – benefit analysis tools (Bannister and Remenyi, 2000). Discussing this phenomenon, Bannister and Remenyi (2000, p. 232) conclude that "either theory has completely lost touch with reality, the theoreticians have failed to get their message across to practitioners, or the body of theory is still very immature and in all probability far from complete." While these authors have stressed the second possibility, it seems that the first statement is also at least partially true. This paper will try to respond to this statement by introducing a simple and ready to use framework for assessing the most important economical aspects of IT initiatives. The aim of this framework is to help enterprises in conscious decision-making concerning IT initiatives. To meet the requirements of practical relevance and ease of use, it concentrates on the most important IT value aspects and intentionally ignores the others.

2. Practical relevance as a critical success factor

Academic researchers in the IT field are beginning to understand that their work is far away from business practice. Practitioners do not read academic journals and do not attend academic conferences. This is surely not because practitioners neglect the necessity of learning and acquiring new knowledge. The IT world is changing so rapidly that every reasonable practitioner in this field understands the importance of constant learning. If someone needs proof, it is enough to visit a good seminar or congress dedicated to practice. If the practitioners search for new sources of knowledge, want to learn, and still are not present at the academic conferences and are not academic journals' readers, the only conclusion might be that Bannister and Remenyi (2000) were right saying that theoreticians have lost touch with reality. Benbasat and Zmud (1999) have also noticed this fact while analysing the MISQ audience. There is absolutely no doubt about the need of theory building research which might not be directly practice-relevant but then there should be a lot of practical research done based on that theory as well. Davenport and Markus (1999) have concluded that the research in the IT field should contain high science, applied theory and practical research in equal proportions. To answer the question on how to increase the practical relevance of the study, it might be beneficial to examine the theoretical concepts successfully incorporated into the practice. Two examples may be Business Process Reengineering (Davenport 1993, Hammer and Champy 1993) and Balanced Scorecard (Kaplan and Norton 1996). Those examples have several common characteristics which are absent in many other academic books and papers:

- The ideas are based on field experiments – the authors were actually doing the exercise in living companies before describing it in a book or article (it is worth mentioning that at least one of the authors in both cases had a consulting background),
- The ideas are ready to use – with enough time and energy, one can take the book and introduce the idea described in it into her/his organisation.

Complying with those two rules should significantly increase the practical relevance of the research. Examining the existing books and papers on IT evaluation, one can come to the conclusion that it is difficult to find examples of ready-to-use methods suitable for evaluating a

Reference this paper as:
Lech P(2007) "Proposal of a Compact IT Value Assessment Method" *The Electronic Journal Information Systems Evaluation* Volume 10 Issue 1, pp 73 - 82, available online at www.ejise.com

wide range of IT investment economic aspects. The indications are either very general (Irani 2002, Renkema 2000, Remenyi et. al. 2000, Willcocks and Graeser 2001) or concentrated only on one specific IT evaluation aspect (Dos Santos 1991, Kaplan and Norton 2004 , Schell 1999). The multi-criteria methods (Parker and Benson 1988, Murphy 2002) are exceptions, but the need to supply more ready-to-use evaluation approaches to the practitioners has already been noticed (Lech 2005, Videira and Rupino da Cunha 2005). This paper is a continuation of the work presented in (Lech 2005) to supply a practically relevant, easy to use evaluation tool.

3. Definition of IT value

As Bannister and Remenyi (2000) pointed out, to be able to assess value, one has to clearly define it. Those authors have discussed the notion of value in detail, citing many definitions, from which the most straightforward one is given by Parker and Benson (1988), stating that IT value is the ability of IT to enhance the business performance of the enterprise. Generalising this definition, one could say that IT value is the ability of IT to support the enterprises' business goals. The business goals will vary from enterprise to enterprise and so the value definition presented here will also be flexible. Of course for most profit oriented enterprises the main goal is to grow and sustain long-term value for the shareholders (Read et. al. 2001, p.11). This value is achieved by the application of a suitable strategy which delivers the answers to the question what tangible and intangible assets should be combined with what processes to create value for a customer (the amount that a customer is willing to pay) that is higher than the cost of creating it (Porter and Millar 1985). If one accepts this definition of value, based on Porter's value chain (1985), it becomes fairly easy to determine the way IT can support the value creation process:

- It can support the strategic and operational goals and thus create value indirectly by allowing the enterprise to act according to the strategy,
- It can generate positive or reduce negative cash flows by decreasing costs, increasing revenues or shortening the operational cycles (from cash to cash) and thus create value directly.

The weights assigned to those two aspects of value and the way they should be evaluated depend on the characteristics of the IT initiative to be evaluated, such as the investment purpose, the IT element to be implemented and the benefit/cost types.

4. Evaluation method formulation

4.1 What and how to evaluate – the general approach

The two factors constituting the IT business value identified above are:

- Support of the enterprise's business goals,
- Direct return on IT investment.

Those two aspects of IT value are certainly present in the existing evaluation methods. Multi-criteria methods, like Information Economics (Parker and Benson 1988) or '5 pillars method' (Murphy 2002) include the 'strategic match' and 'direct return' as the evaluation parameters. Treating strategy as the 'black box' and assigning one rank only, which states whether the IT initiative supports the strategy or not, seems strongly insufficient. Neither of these methods give indications on how to calculate the direct return. If the evaluation method is to be used in practice, both aspects should be explored in far more detail. The evaluation should answer the detailed questions about what business goals, related to which business processes are supported by the IT solution, how important these goals and processes are in the value creation and to what extent the IT solution is necessary to achieve them. Information Economics evaluates some other IT initiative characteristics from the business and technology domain. All the characteristics from the business domain, except for risk, should be reflected by the company's goals' analysis. Enterprises may undertake IT initiatives for many strategic, as well as operational reasons. Moreover, usually one initiative would be undertaken for more than one reason and the list of possible IT initiative goals is infinite. By limiting the number of evaluated factors 'ex definitione', one can thus miss the important information. The only characteristic from the business domain that would not come out of the IT initiative goals is the risk. Risk, defined as the uncertainty of achieving the desired goals, has to be incorporated into the evaluation model.

The technology evaluation of business-oriented IT initiatives seems to be less important now than it was in the early 1990's, when multi-criteria evaluation methods were designed. This is because of two main reasons:

- Most IT packages are now available for all leading technology platforms,
- The technology is changing so fast that most enterprises do not treat technology as a fixed, strategic choice

The technology in my opinion should be evaluated mostly from two perspectives:

- Risk factors, which should be added to the risk evaluation,
- As the helping, additional factor while choosing the specific system.

Reassuming, the three main aspects that must be considered during IT business value evaluation are:

- Support of the enterprise's business goals,
- Direct return on IT investment,
- Risk (organisational and technological).

This answers the question of what to evaluate. Then it is necessary to determine how to perform the evaluation of each of the aspects. As it was already stated, the plethora of situations in which IT investment decisions are made virtually exclude the possibility of designing one, rigid evaluation approach. This fact was recognised by some groups of researchers (Bannister and Remenyi 2000, Deschoolmeester et. al. 2004, Farbey et. al. 1992, Willcocks and Graeser 2001) who postulate to relate the evaluation methodology to the characteristics of the IT initiative. Such an approach to the evaluation is called the 'meta approach' (Bannister and Remenyi 2000) or 'contingency model' (Serafeimidis and Smithson 1999). In the next section, the indications for creating the evaluation model, based on the main IT initiative characteristics, will be presented.

4.2 Determination of evaluation strategy

The summary of the IT initiative characteristics to which the evaluation method is related in literature is available in (Lech 2005). From the analysis of those characteristics it becomes clear that the main one is the reason for IT investment. The purpose of implementation determines the general evaluation strategy and strongly affects the next steps. The proposal of the purpose – evaluation technique mix is available in (Remenyi et. al. 2000, p. 66). Those general indications must be converted into the more detailed rules of evaluating each of the IT initiative's aspects listed in the previous section. The proposal of a relation between investment purpose and the way those aspects should be evaluated is presented in Table 1.

Table 1. Investment purpose – evaluation strategy own elaboration, based on: Remenyi et. al. (2000)

Investment purpose/type	Goal measurement	Direct cost/revenue measurement	Key success indicator
business survival (must-do investments)	IT initiative functional goals (goal achievement)	costs	achievement of the functional costs at the expected cost level
business improvement (operational investments)	operational business goals (goal dependency on the IT initiative, goal achievement)	revenues/costs	operational goals achievement, revenue/cost ratio >1
competitive advantage (strategic investments)	strategic business goals (goal dependency on the IT initiative, goal achievement)	costs or revenues/costs	strategic goal achievement
capacity improvement (infrastructure)	IT initiative functional goals (goal achievement)	revenues/costs	functional goals achievement

The investment purpose is the general factor determining what should be measured. If the investment is a must-do – which means that it is either required by law or is an industry standard, then the main strategic goal lying behind is clear and fixed: 'staying on board'. This business goal is achieved when the functional requirements of the IT initiative itself are fulfilled. The achievement of the IT functional goals (meaning: achievement of the desired functionality of the IT system) is the first evaluation criterion. The business survival investment does not have to be directly profitable as the main benefit from this kind of IT initiatives is the possibility to continue the (possibly profitable) business activity. The cost revenue optimising criterion for such investment should thus be to obtain the desired goal at minimum costs. Direct profitability evaluation can be therefore made for costs only.

The business improvement IT investments are undertaken to achieve operational business goals, which may or may not be directly related to the main strategy of the enterprise. If they are, the IT initiative should be evaluated in the same way as the one that helps to gain competitive advantage. If they are not, the effect of the IT initiative should provide direct benefits that exceed costs. Direct profitability will be the central aspect of the evaluation. Of course, the IT initiative will provide the desired direct benefits only when the operational goals are achieved, so this aspect has to be measured too. Moreover, the role of IT in the achievement of the operational goals may differ from case to case. If the achievement of these goals is not possible without the evaluated IT initiative, its importance will be grater than when it plays only the supportive role and the business goal could be achieved without the IT project. The goal dependency on the IT project will be the third

aspect of the evaluation. Strategic investments are undertaken to enable or support the realisation of the enterprise's strategy. Therefore most business benefits come from the strategy, not from the initiative itself. The main evaluation effort should thus be put into assessing the dependency of the strategic goals on the IT project and the degree to which the strategic goals have been achieved. Direct benefits from IT are less important here and in many cases it seems reasonable to track the project costs only.

If the investment has the purpose of increasing the technical capacity, then the achievement of the functional goals (technical specification) will be the main success and thus also evaluation criterion. Achieving these goals may cause some direct benefits (like IT infrastructure maintenance cost reduction) so the cost/benefit analysis should also be performed. An additional benefit will be the option for further development and this may also be assessed in the extended evaluation process. The investment purpose analysis answers the question to what aspects of the IT initiative the main focus of the evaluation should be set. In the next section, the evaluation framework will be presented together with the indications as to what elements of this framework should be used depending on the investment purpose.

4.3 Goal support measurement

The main value of IT comes from creating the possibility of doing the business in a way, which would be impossible without it. Therefore in that case, IT does not create the value directly but acts as an enabler for value-creating business actions. What should be thus measured, from the IT perspective, is:

- The degree to which business goals are dependent on the IT solution (goals' IT dependency),
- The degree to which business goals are achieved (goals' achievement).

The first aspect can be evaluated both before (ex-ante) and after the IT investment (ex post). The business goals achievement can be assessed only during the ex-post evaluation.

4.3.1 IT initiative goals' identification

The first step here is the identification of all business goals related to the evaluated IT initiative. If the business need for IT investment comes from the enterprise's strategy, there is a tool available, allowing to identify and initially evaluate IT initiatives that satisfy this need: the 'strategic readiness report' by Kaplan and Norton (2004). It provides a list of IT applications needed to accomplish the strategic business goals coming from the balanced scorecard, together with the overall rating, stating whether the application is already in place, under construction, needs to be enhanced or developed from scratch. Those applications which have been identified as new or requiring major enhancements constitute a list of strategic IT investments. The main strategic goals which should be achieved with the help of those IT initiatives are also available from the strategic readiness report. However, to be complete, the list has to be worked out in more detail. The strategic goals rarely happen to be achieved directly: more often they would be a result of achieving a set of operational goals. If this is the case, the list of IT initiative business goals should be expanded with these operational goals. The operational goals should be then related to the functional goals of the IT project, stating how the business goals will be realised in the information system. The procedure of converting the strategic business report into the IT initiative goals list is illustrated by figure 1:

The goals above the dotted line come directly from the strategic readiness report, whilst the ones below were added during the IT initiative evaluation process. If the enterprise does not use a balanced scorecard to illustrate its strategy, the list of the IT initiative goals would have to be made independently. For strategic IT projects it will look exactly the same as the one presented on the right-hand side of figure 1. For business improvement initiatives, the list will usually contain only operational business goals and functional goals of the IT project. For business survival and capacity improvement projects, the list might contain only functional goals.

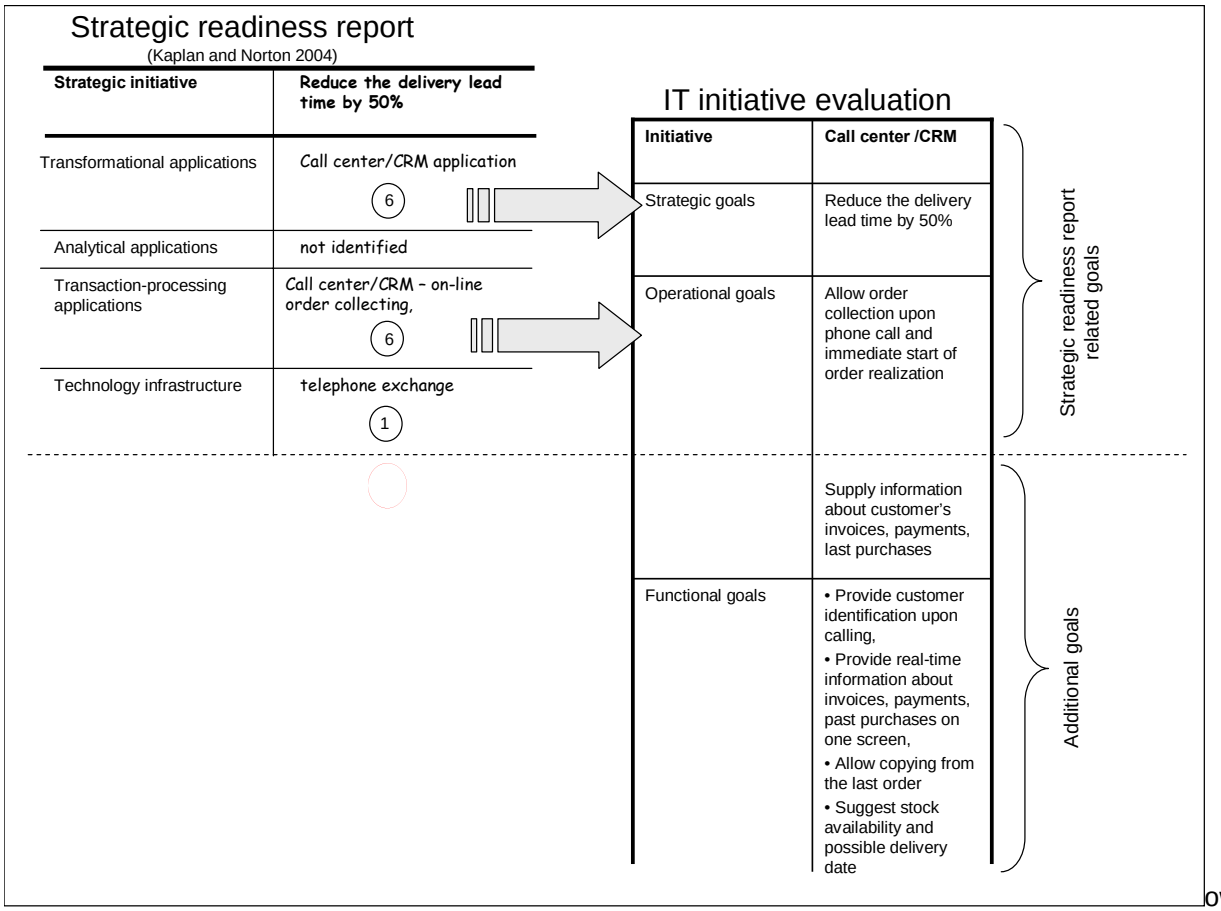

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Figure 1. Preparation of the IT initiative goals list elaboration, based on Kaplan and Norton (2004)

4.3.2 Evaluation of business goals' IT dependency

Having the list of business goals related to the IT initiative, one can start to evaluate the dependency of these goals on IT. This evaluation will be performed mostly for strategic and business improvement investments. The evaluated IT project can play different roles in the achievement of business goals: it can be indispensable for the business goals to be achieved, can play only supportive role, be neutral or even may hinder their achievement. There seems to be no other way of evaluating this aspect than by ranking. The proposition of the ranks is presented in table 2:

Table 2. Ranks for dependency of business goals on IT initiative

Rank	Meaning
3	A goal cannot be achieved without the IT initiative.
2	IT initiative will strongly facilitate the achievement of the business goal. Goal achievement without the IT initiative is theoretically possible but there is strong probability that the result will be weaker.
1	IT initiative has supportive role in the achievement of the business goal. There is a way of achieving the goal without IT.
0	IT initiative has no impact on the possibility of achieving the business goal.
-1	IT initiative may hinder the realisation of the business goal. It may lengthen the time or increase the budget by less than 50%
-2	IT initiative may strongly hinder the realisation of the business goal. If the initiative is undertaken, it may preclude the achievement of the business goal in 100%, lengthen the time or increase the budget by more than 50%
-3	IT initiative makes the achievement of the business goal impossible.

The overall rank will be calculated as the mean of the ranks for business goals related to the IT initiative. If the overall rank for the initiative considered to be strategic is 2 or more, this means that its role in accomplishing the strategy is high and the business value should appear primarily as a result of the strategic initiatives. The evaluation should focus on goal achievement and cost control. If the rank is less than 2, it means that the initiative has only a supportive role for strategy attainment and should rather be treated as a business improvement initiative. Further

evaluation should concentrate on direct profitability and business goal achievement. For IT initiatives considered to be operational (business improvement), the overall rank shows its significance in accomplishing the desired goals. If the rank is 2 or more, the initiative should be undertaken. If the rank is less than 2 it is necessary to study carefully all the other options of achieving the desired goals and choose the one with the optimal efficiency.

4.3.3 Evaluation of IT initiative goals' achievement

The next step during ex-post evaluation is the evaluation of the goals' achievement. This evaluation concerns both business and functional goals. If the business goals' list is prepared based on the strategic readiness report, then each of the goals has some kind of measure assigned to it in the balanced scorecard. If the goals do not come out of the strategic readiness report, then the measures should be assigned to them during the IT initiative goals identification. During ex-ante evaluation, it is necessary to examine each of the goals separately and design the measurement system for each of them. If the enterprise is using some kind of performance measurement system, then this system should be used to evaluate business goals. Functional goals are usually described during the requirements gathering process (which is part of the software engineering that is not the subject of this paper) in such a way, that it is relatively easy to determine, whether the goal is achieved or not.

4.4 Cost, revenue and risk measurement

A lot of work has been already done to identify and classify the IT costs and benefits (Irani 2002, Lucas 1999, Murphy 2002; Remenyi et. al. 2000; Renkema 2000). The list of benefits and costs varies from case to case and must be determined for each IT investment individually. Following Zuboff's (1988) classification of IT benefits, to identify possible benefits one has to formulate and answer the questions like:

- What processes will be automated?
  - What will the process cost reduction be?
  - Will there be any process error reduction and what is the average cost of an error?
  - Will it shorten the process time and what will be the value of finishing the process sooner?
- What new, currently unavailable information will be provided by the IT initiative and what is its value for decision making?
- What information will be available in a shorter time than now and how will it affect the decision making (and the expected value of these decisions)?
- What resources will be released due to the process automatisation and new information?
- What new products and services will be available thanks to IT and what is their value?
- How will IT affect the quality of service, customer care, contacts with customers and how could those be valued?

A good way of structuring the benefit search is to perform the business process analysis workshop, during which each process is analysed with the use of the questions listed above. The list of the questions is of course open and has to be modified during the workshop, according to the current life scenario. Activity-based costing can be a helpful tool in searching for business process cost reduction as well (Roztocki and Weistroffer 2004). Cost identification seems to be an easier task although it is not necessarily the truth (Maanen and Berghout 2002). At least main costs, like licence fee, hardware cost, implementation fee, maintenance cost are in most cases direct, simple costs, easy to identify and value. After the preparation of the benefits and costs list, it is necessary to choose the appropriate measurement method. The description of the commonly used evaluation methods and the process of assigning the method to each cost and benefit is described in (Lech 2005).The last issue is the risk. From the practical point of view, it is more important to identify and manage the risk than to assess its value. The easiest way of incorporating the risk factor into the evaluation model is to reflect each of the benefits and costs as a range with assigned probabilities rather than a fixed value.

5. Field study

The methodology of evaluating IT investments presented above will be illustrated by a field study, performed in a medium-sized production company. The information for this field study was gathered during the life project, carried out according to the methodology presented above in which I was a project leader and leading consultant.

5.1 Description of a company

The company is the country leader in the production of external identification systems. The company produces and installs signing systems for petrol stations, shops, banks etc. Most of the production is made to order and the orders are usually short and non-repetitive. Being the technological leader in the country, the company

does not have problems with sales of its products. The main problem that the company faces is the lack of production capacity not allowing it to accept all the orders. Due to this fact, the company has come the conclusion that implementing a new ERP system would be the solution to this problem. The evaluation has been performed to find out if the implementation of the ERP system would add value to the company.

5.2 Evaluation process description

The evaluation has been performed in the following steps:

- Workshop with the CEO to determine the business goals of the enterprise.
- Preliminary analysis of the existing IT environment
- Business process modelling workshop (direct benefits search)
- Analysis of the:
  - Support of the business goals by the currently performed business processes – proposal of the process change,
  - Support of the processes by the current IT environment,
  - Possibility of supporting the processes with the ERP system.
- Value analysis:
  - Goals achievement,
  - Direct payback.

During the business goals' workshop the following main goals have been identified:

- Increase the production capacity usage by better organisation of the production process (benchmark from a similar company in another EU country stated that there is a possibility to increase the capacity usage by 40 %),
- Keep the currently applied short lead times,
- Keep the possibility to accept orders for non-standard products and offer short lead times for them,
- Eliminate delivery delays,
- Allow the company to analyse the profitability of each order.

The analysis of the currently used IT systems has revealed that the enterprise is using a homemade solution that has most of the functionality needed for production and material planning. Thus a workshop has been performed to find out, how this system is used to support the business processes. The business process-modelling workshop gathered key people from all departments. Each process was examined from the following perspectives:

- Process improvement:
  - How is the process performed now?
  - What could be changed in the process itself to make it better?
  - What inputs from the other processes are necessary to make the analysed process better?
  - What information is necessary to make the process better?
- Process support by IT:
  - How is the process supported in the current system?
  - What is the reason for not using the available system functionality?
  - How should the system be supported by IT (model approach)
  - How could the current system be improved to support the process better?
- Process value:
  - What is the process value for the customer and how will it be improved if the process is changed and properly supported by IT?
  - What is the process cost and how can it be reduced?
  - What resources does the process use and how these can be reduced?

The data gathered during the workshop has formed the basis for the next analytical steps. It became clear that the problem with low production capacity usage emerges not from the lack of IT support but from organisational problems. IT tools allowing proper material and capacity planning were available in the currently used system but they were omitted by the employees. The ERP system would not solve the problem as it could be omitted as well. It became clear that to support business goals, it is necessary to implement organisational procedures that will force people to input the information about the production process into the system. The value analysis of the two IT variants (enhancements to the current system and implementation of ERP) has been done based on the information gathered during the workshops.

5.3 Results of IT value analysis

The summary of the value analysis is given below. As the IT investment is clearly a business improvement one, it should be performed only if the revenue/cost ratio is more than 1. The aspects to be evaluated are:

- Operational business goals support,

- Direct payback.

Business goals support were evaluated with the use of the ranks presented in Table 2:

Table 3. Evaluation of business goals support

No	Business goal	Current system	ERP	Remarks
1	Increase of the capacity usage	2	3	The use of ERP might lead to the capacity usage increase up to 40% but can cause longer lead times (detailed BOM-s needed) and decrease elasticity in accepting non-standard orders. The use of the simplified production planning in the current system should cause the capacity usage increase by 20%.
2	Keep short lead times	2	-1	The usage of MRP procedure will lengthen the lead times as the detailed BOM and work routings is needed for the new products before the production start.
3	Accept non-standard orders	2	-1	as above
4	Eliminate delays	2	2	
5	Enable profitability analysis	3	3	
	Mean rank	2,2	1,2	

The current system supports the business goals better than ERP.

Possible direct benefits were identified and those, for which it was feasible, were assigned a monetary value. The expected value of the revenue increase due to better capacity usage was estimated as 1 200 000 EUR per year. The reduction of non-rotating stock was estimated as 40 000 EUR per year. Some other possible benefits like transport cost optimisation, better assembly and post sales service planning were identified but it was impossible to assign a value to them. Thus the measurable benefits were estimated to be **1240 000** EUR per year. The cost analysis of the two variants gave the following results:

Table 4. Estimated costs related to the usage of the current system

Activity	Cost
Prepare and input BOMs and routings for each new product – simplified version (1 employee)	15 000/year
Real time input of all information concerning production (material issues, material returns) (1 employee)	15 000/year
Necessary enhancements in the current system (internal IT department) 3 months	4 000
TOTAL	34 000

Table 5. Estimated costs related to the ERP implementation

Activity	Cost
Prepare and input BOMs and routings for each new product – full version (2 employees)	30 000/year
License	180 000
Maintenance	25 000
Implementation	240 000
TOTAL	475 000

Providing a similar level of benefits, the usage of the current system is less costly than implementation of ERP. The overall recommendation is to enhance the currently used system as it supports the business goals better and provides better ROI than the ERP suite.

6. Summary

The main aim of this paper was to propose a framework for creating practically relevant, easy to use evaluating methods that would help enterprise managers in taking reasonable decisions concerning IT investments. To keep it as simple as possible, the framework concentrates on the two aspects which seem to be the most important in creating business value of IT: support of the enterprise's goals and direct payback. It relates the IT initiative aspects that should be the subject of evaluation as well as the success criteria, to the investment purpose. It then gives the indications on how to determine the business goals related to the IT initiative and evaluate the support of these business goals with IT. It provides some fingertips for the search of direct benefits as well. The use of the method was illustrated by the field study, which proved its usability for decision making at least in the case being the subject of this study. Of

course the method presented here would not solve all real-life IT investment decision problems but it supplies the framework for further development and research.

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