

Value of Project Management –a Value Assessment Based Case Study for Software Project

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Abstract: - The amount of software has increased in several products. Software projects have become more complex and their management requires significant amount of skills from every project manager. The amount of available resources, strict budgets, cost control and need for accurate reporting and documentation as well as good quality are part of every project managers' life.

As business challenges project managers more and more it would be useful to know what areas of project management create biggest value to the projects. Value Engineering has been a usable method for developing high value products for several years. It has been applied successfully to software processes as well as to software product development.

This research analyses the value of project management using Value Engineering based value assessment. This is done in part by defining the concepts of value, worth, cost and in part by outlining the Value Engineering process with project management practices.

The practical industrial case shows that there is big variety in value between typical project management tasks. It also shows that value of project management tasks can be improved using value Engineering based value assessment.

Key-Words: - project management, software engineering, value engineering, worth, cost, value.

1 Introduction

The objective of the value-based approach [8] is to find ways to eliminate value loss in software development, software products, and software process improvement (SPI) using the value assessment framework of Koskela and Huovila [4]. Value-based approach uses economic-driven tools, which are based on economic studies including, for example, the areas of cost estimation, cost calculation (for example ABC and life cycle costing) and investment calculation. The value-based approach prefers calculating costs instead of estimating them, and also considers software development and SPI as investments, on which it is possible to spend too much money [1, 11]. In practice, it takes care that the customer requirements are met in the best possible manner, ensuring quality, timeliness and value in products as well as in processes, over their entire life cycle. In particular, the aim of ensuring quality connects it to the other methods aiming for quality improvement.

The value-based approach indicates a clear dependency between the process and products. It sees that we need to develop and optimize process activities so that processes produce the products needed. Furthermore, it sees that we must analyze products in order to reveal problems in processes and develop processes from the product point of view as well. This is vitally important, especially for companies respecting customer opinions and aiming to optimize costs in their processes, because the customers are the ones paying for the products and product-related services, and companies have to allocate all costs to products to be able to price them. The happier the customer is, the more worth he sees in buying the products from us. It is also clear that when we know our process and product costs, worth and value, our ability to estimate, budget and control future risks will improve significantly.

The purpose of this study is to collect experiences of using value assessment to find differences in the value of project management

tasks. In more detail the purpose is to answer to following questions:

- How the value assessment of project management tasks works in practice?
- Do project workers see it helpful for assigning limited resources?
- What are the strengths and weaknesses value assessment?

2 Value Engineering

According to the all Value Engineering (VE) processes have similarities. Generally, they state that VE collects and analyzes value-related information, to create new ideas using the analyzed results and to evaluate and further develop them into a meaningful package, with the reduction of costs or the increase of worth and improvement of value as ultimate goals.

This study categorizes VE process into three main phases: pre-study (orientation), value study (information, function analysis, creativity, evaluation, development, presentation), and post-study (monitoring, implementation). These phases are considered appropriate since they constitute independent areas of VE and have been justified in earlier discussion [8].

According to Value Engineering, value is a measure – usually in currency, effort or exchange, or on a comparative scale – which reflects the desire to obtain or retain an item, service or ideal. Cost is the price paid or to be paid. It can be divided into elements and, to some extent, functions. Park [9] defines cost as “an expenditure of money, time, labor, etc., to obtain a requirement.” Worth is usually defined as the lowest cost to perform the required function, or the cost of the lowest-cost functional equivalent. The most typical definition for value is perhaps (1):

$$\text{Value} = \frac{\text{Worth}}{\text{Cost}} \quad (1)$$

where:

Value = The value of some object, product, service or process.

Worth = The least cost to perform the required function (product, service or process), or the cost of the least cost functional equivalent. If possible can also be the worth in

money, what customer sees in product, service or process.

Cost = The life cycle cost of the object, product, service or process (price paid or to be paid).

If we consider worth in the formula rather often used definition for value has been: (2) [2, 3, 7, 9, 10]

$$\text{Value} = \frac{\text{Function} + \text{Quality}}{\text{Cost}} \quad (2)$$

where:

Function = The specific work that a design/item (product, service or process) must perform.

Quality = The owner’s or user’s needs, desires, and expectations.

Cost = The life cycle cost of the product, service or process

3 Project Management

In the literature there are several definition for project management. Lubbes [5] has defined project management to be concerned of the entire software lifecycle. He sees that project management plans, controls, coordinates and leads all activities required to provide needed software involving both the buyer and producer of that software. Merriam Webster [6] defines project as: a method worked out in advance for achieving some objective and management as: the act or activity of looking after and making decisions about something. Wikipedia [12] sees project management to contain scheduling, cost control and budget management, resource allocation, collaboration software, communication, quality management, documentation and administration.

Together these definitions outline rather well the nature of software project management. It considers all tasks during the software lifecycle. Therefore it is perhaps difficult to find one unique definition for it. It greatly depends on what kind of weight one wants to put to each task and how important one sees each of them.

For the purposes of this study the definition of Wikipedia seems to be usable. It highlights rather clearly the different aspects of software project.

4 Value Assessment for Software Project

Value Assessment for software project management tasks was implemented in summer 2008. It was based on several interviews implemented in large international project. Together with the interviews several documents were analyzed during the assessment, including for example, strategy definitions, project-, testing- and quality plans as well as different financial statements, principles and reports.

4.1 Information

The project assessed was a project developing an electronic product containing software and hardware. Project included both vendor and customer. The implemented assessment was supported and sponsored by the vendor's and customer high-level management. In the assessment opening meeting, the purpose of the assessment was discussed with the vendor and the customer. The definition $\text{Value} = \text{Worth}/\text{Cost}$ was discussed, and it was seen as important to find out which tasks of project management gave the best value to the vendor without neglecting customer needs.

Both vendor and customer considered natural the project management tasks defined (scheduling, cost control, budget management, resource allocation, collaboration software, communication, quality management, documentation and administration) In the assessment, defined tasks were discussed for ensuring that all interviewees understood them equally.

The vendor emphasized that as the assessed project was mainly implemented to its' personnel it would like to undertake the phases from creativity to presentation without the customer being present, since these phases included brainstorming to gain a new understanding of all the most efficient way of working in their company.

The customer saw that the most interesting phase for them was functional analysis, where both sides would prioritize tasks related to project working and give estimates of worth and cost using relative numbers like percentages (not stating real costs). The customer understood all

wishes of vendor and saw that they did not have a strong interest in development of working tasks as it also is more difficult also for designers and managers to speak about the problems when customer was present.

4.2 Function Analysis

In the first assessment meeting four customer representatives (referred to as "customers") and ten vendor representatives (referred to as "vendors") prioritized the project management tasks. Afterwards, the customers allocated worth to each task using a percentage scale from 0% to 100%. The idea was to identify in percentages what kind of worth the customer sees in the project management tasks. The vendors allocated costs using the same percentage scale from 0% to 100%. As a result of this, the customers had given worth percentages for all tasks, and the vendors had given cost percentages for the same items. The calculated worth and cost were later compared, using percentages, to the real worth and cost, to find out the difference between "belief" and "reality". During the function analysis phase the discussion of project tasks was alive. Common understanding of project management tasks and their importance seemed to be an interesting topic. All interviewees had an opinion of what is important and what is less important. It was rather easy to see that depending of the background and responsibility in the project, opinions varied. However, all tasks were seen necessary in successful project management by all interviewees.

All the interviewees agreed that the prioritization of tasks clearly helped in the next phase, in which the same tasks were analyzed in terms of worth and cost. When asked to mark how much worth they would assign to each task, the customer representatives preferred to use percentages rather than actual monetary values. The vendors shared this viewpoint, and stated that it was easier for them to give cost information in percentages rather than in actual figures.

The customers found it easy to assign worth to tasks.. The vendors also considered it easy to assign costs to tasks. Both sides emphasized that tasks are easy to understand because they are

based on common discussion and defined concept of each task.

The results of task prioritizations were understandable and expected among the customer and vendor representatives. Slight differences existed, and these were discussed thoroughly. The customer found differences between how their technical and business oriented personnel saw tasks. The vendor also found differences between the project management's and the technical personnel's comments. It seemed that the amount of technical knowledge gave more logical reasoning for understanding the implementation of tasks. By comparing the customer's and vendor's averages it was also possible to identify some significant differences between their respective priorities.

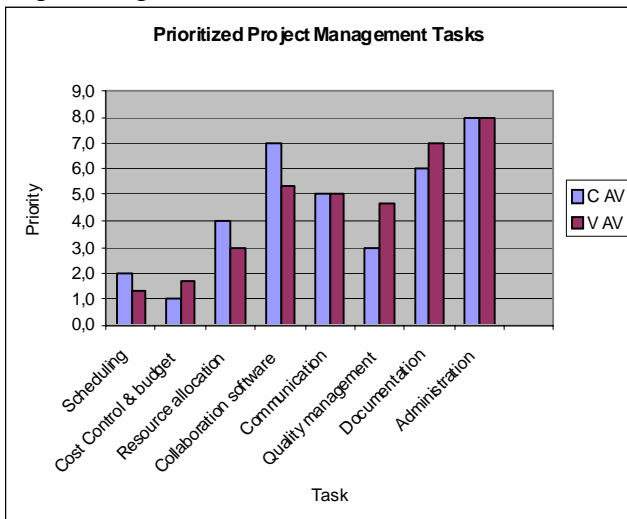


Figure 1: Prioritized project management tasks including all interviewees (AV=average, C=customer, V=vendor)

One conclusion of discussions was that worth and cost allocations for all tasks were seen as relevant for both sides, even if only stated as percentages. According to customer they also had their own idea about the actual costs of project management, and since they knew the worth they were satisfied for the situation. Figure 1 presents the average worth and cost for project management tasks.

On the whole, the experiences of using prioritization in ranking project management tasks were positive. Even more interest was seen in the analysis of worth and cost for each task,

and especially in the differences identified between customer and vendor, as well as between technical- and business-oriented personnel.

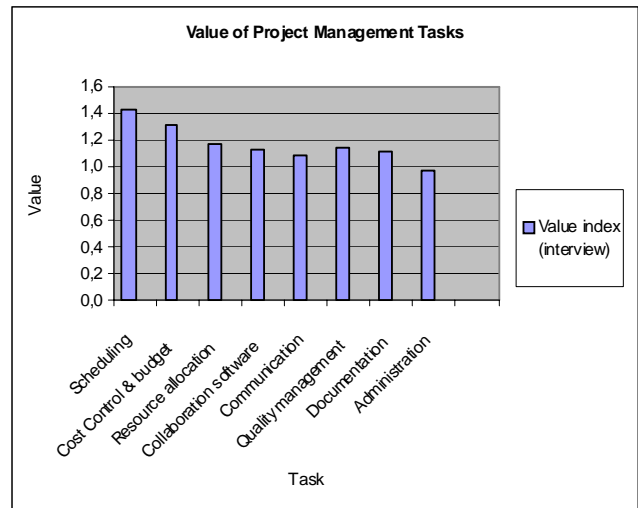


Figure 2: Average worth and cost for tasks including all interviewees (AV=average, C=customer, V=vendor)

4.3 Creativity

In accordance with the agreement between the customer and the vendor, only the vendor participated in the phases from creativity to presentation. The first step in the creativity phase was to allocate costs to all project management tasks. According to the vendor it was easy to allocate costs to the tasks. General costs were perhaps the most difficult costs to allocate. This was because costs such as the director's salary usually cannot be allocated directly to any particular project or project task.

After cost allocations had been completed, the project team started brainstorming. The vendors evaluated priority lists, figures, and worth and cost calculations for all management tasks. All personnel were encouraged to explain how they would improve value at project management. According to their comments, clear figures helped a lot in understanding where the most significant differences in value existed. Based on the figures it was noted that certain tasks did not create good value. After discussion of this, the project members shared the opinion that this was because of the unfinished project.

This had an influence on the entire project and thus created significantly higher costs.

Project members could also see from the charts presented how time-consuming it was to start using new technical environments, without good planning. The new technical environment delayed the implementation tasks significantly. New technical challenges, such as developing software for multiprocessor environments, were also named as one reason for delays. This was because project personnel did not have sufficient training in working in the multiprocessor environment. As a result of all the problems mentioned, working hours were about 15 % higher than expected.

4.4 Evaluation

At the beginning of the evaluation phase the project team discussed criteria for the evaluation of improvement ideas. The criteria decided on were team spirit, profitability, time to market and quality. First, all the project team members were asked to give a relative percentage (max 100 %) for how important each criterion was for their project. Secondly, project personnel calculated averages for all the criteria. The calculated averages were as follows: team spirit 20 %, profitability 30 %, time to market 30 % and quality 20 %. After thus defining the weightings of the criteria, the project personnel gave points to each improvement proposal on a scale of one to four, where four indicated maximum points and one, minimum. The points allocated were multiplied by the calculated weighting percentages.

The project team discussed these results. The most surprising result was that the importance of the quality was the lowest among all criteria. Problems in project planning were expected. Estimation and multiprocessing got the least points, so their importance to the project was not considered to be as high. The more business critical the project would have been the more weighting the profitability criterion would have got.

The impact of risks was calculated separately so that risk discussion was not influencing to content discussion itself. Based on creativity phase project members evaluated that there is 50% likelihood that costs are overrun by 20 %

due to the need of working overtime so that all tasks would be implemented. Project team also evaluated that based on the earlier experience there is 40% likelihood that 20% extra maintenance work is needed due to the quality problems when product is given to the customer. This risk was also taken and company prepared to keep original timetable and reserved more maintenance resources for the next month related to the product delivery on agreed time to market.

4.5 Development

In the development phase, the biggest improvement ideas were separately developed further, in order to examine their practical implications. Each idea developed included issues such as description, positive consequences, negative consequences and potential cost savings.

The project personnel stated: "It has been difficult to work in an international project without a detailed project plan." Several project phases have suffered from this situation. There had not been enough time to review results, which can be seen in the presence of several incomplete plans. The project team calculated that if there had been time to make proper more comprehensive plans and reviewing them, the project would have been 900 working hours shorter. The potential cost savings would have been about 91 000 €.

At the moment, the ability to use the existing characteristics of technical tools is weak. The use of pre-existing components is also rather poor. The result is that code has to be written from start to finish each time. The project group evaluated that if basic components for development work had existed, 510 fewer working hours would have been required. If there had been sufficient technical training concerning the new environments (dotNET and ATL 7) for key personnel, 430 fewer working hours would have been required. In total, the potential cost savings would have been approximately 92 000 €.

From a project management point of view, it is problematic that all the employees are always assigned one hundred percent to a given project. As a consequence, there is not enough support

available if needed, and “the wheel is invented several times in different projects.” The project team evaluated that with satisfactory support in evaluating the architectural plan, the design plans, and the extra need for time in starting to use new technologies, 600 fewer working hours would have been required. In financial terms, this would have meant a saving of about 63 200 €.

4.6 Presentation

The results of the value assessment were presented phase by phase to the high-level management. The project team supported the presentation by giving brief comments. In the presentation, a clear emphasis was placed on presenting customer needs and wants, and the corresponding costs to the company. The value indexes were used to outline the existing value-increasing opportunities. The potential cost saving proposed was approximately 33 % of the project’s budget.

The impact of risks if realized was considered to increase costs by 19 %. Top management took this impact seriously as it was a significant for value and profitability.

After the presentation had ended, the management wanted to discuss the value improvement opportunities and risks with the project personnel. Some improvement ideas were implemented and some were developed further; others were postponed due to lack of resources. As a whole, the assessment strongly emphasized collaboration between the customer and the vendor, and all the improvement proposals were in line with the customer’s interests as well. The calculation of risk impact was considered seriously as all participants understood that in the worst case designed product would not be profitable anymore if all risks would be realized.

All customer and vendor representatives considered value assessment an interesting method for the development of management processes capability and value.

5 Conclusion

The purpose of this study was to answer to the following questions:

- How the value assessment of project management tasks works in practice?
- Do project workers see it helpful for assigning limited resources?
- What are the strengths and weaknesses value assessment?

Question 1: This study proposed a Value Engineering -based assessment method for finding out value in project management activities. Based on the findings of the industrial case proposed assessment method was considered to be in place.

Question 2: Project workers saw assessment results useful for assigning limited amount of resources to more value containing activities. They also told that the assessment phase related to the improvement part of the assessment (creativity to development) was useful for their purposes for improving value.

Question 3: The used value assessment method seems to be usable for finding out value in project management activities. It also seems to give a good starting point for cutting costs and increasing worth of project management activities. However, as this study is based on only one industrial case it might be too early to draw complete conclusions on the usability of the method in different kinds of projects.

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