Employing QFD in Supplier Selection: IT-Project ASP-Software 'Chefplan Online'

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Abstract

This paper describes the successful appliance of QFD methods to select and manage external IT Service Providers / IT Suppliers within an IT project.

On one hand, realization concepts or technical ideas of the various potential external IT partners were analyzed, compared and weighted with also QFD-engineered requirements;

on the other hand, QFD methods were also used to measure, to compare and to weight the IT Service providing companies themselves – in terms of company reputation, ways of working, QA, test methods, financial solidity, given warranties, securities offered and so on.

The selection of the most suitable IT Supplier was based on a traceable, verified and most objective decision: QFD.

Keywords: IT Service Provider / IT Supplier Selection, Quality Function Deployment

Introduction

In the area of Information Technology (IT) the inclusion of external partners is playing a bigger and bigger role each year. This happens in outsourcing of processes as well as in IT projects – such as developing new software or customizing/modifying/extending existing software. So the finding and selecting process of suitable, external IT partners becomes more and more important. A report about outsourcing of the IT-department of a major German bank states: "The evaluation of IT service outsourcing is difficult, because of its strategic position in enterprises [1]". Several blue-chip and other market-leading companies regard the finding, selecting and handling of external partners meanwhile being a core-competence within their company [2].

This paper describes the successful usage of QFD in selecting an IT Service Provider to develop and to provide an Internet-based tool for management accounting and corporate planning.

Common / Conventional Supplier Selection Methods

Throughout the IT-Industry, the selection of external project partners is usually done by a Request for Tenders and/or by a Request for Quotations. These requests are based on a pre-defined project goal, intended software functionality, expected results, needed and/or desired interfaces, side effects and so on. If the IT project is part of an overall architecture, or if it has to work with given other devices or software, these interfaces and requirements have to be set and have to be engineered as well. In this early project stage, all facts and requirements, which can be thought of, are written down and are weighted sometimes. Finding and identifying potential and suitable suppliers can be done following or parallel the requirements engineering phase of the project. The market research of project partners can be done in multiple ways (trade fairs, exhibitions, ranking lists, catalogs, the Internet and so on).

If one or some suitable suppliers are already in business or known before the requirements engineering takes place, there could be a seduction of including their expertise into the process of gathering and weighting tasks and requirements. This would lead to narrowing down the designed product features. Suppliers could be in a position to have the tender being written ideally suited only for them, i.e. with

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(high prioritized) requirements that can only be fulfilled by them and not by the competitors. But even when finding and identifying suitable suppliers is done completely separated from the early stages of requirements engineering, every set or every pre-selection of suitable potential partners is biased by recommendations and by reputation.

Like experiences, reputations and references can only be seen being of real high value in an unchanged or only slowly modified environment. The situation of the rapidly changing world, especially the situation of the speedy progress in achieving new knowledge in computer sciences, makes the value of experiences, reputations and references disputable.

There are multiple publications about supplier selection strategies in manufacturing companies, e.g. [3], or in supply chain management, e.g. [4]. Theses strategies all have in common that the supplier delivers tangible goods and that these goods can be sampled, quantified, tested and prototyped.

Software is an intangible product. And software has to be developed usually uniquely (if not, then it would not have to be developed, but standard software could be used). So its creation process is kind of unique as well. Therefore, a supplier cannot give a sample of the software that has to be developed – a supplier can only point out to similar or comparable developments in the past.

So-called 'Soft-Factors' like sympathy, recommendations, reputation etc. are usually playing a major role in deciding for an IT service provider or outsourcing partner. Like, for example, in offshoring, "soft factors influence decisions on target countries for more than 40 % of the companies [5]".

In common / conventional supplier selection methods all known facts and known requirements are written down, the Request for Tenders and/or the Request for Quotations is sent to some potential suitable project partners – and their incoming tenders (respectively quotations) are compared by checklists or some other weak criteria as well as by the biased opinions of the staff involved.

Finally the decision for the subjective best partner is made.

This all-too common 'traditional' or 'chaotic' approach lacks objectivity and traceability of decisions. It lacks keeping an overview and it lacks the certainty of not forgetting or neglecting some requirements during the selection process. And handling more than only a handful of quotations in this 'chaotic' way is nearly impossible.

Literature on managing external contracting or outsourcing describes in detail, how the contracting or the controlling of an external partner can be carried out – these are some later IT project stages. The substantial task preceding this, the supplier finding and selection process itself, is often only mentioned like "a request for proposals from potential suppliers has to be prepared [6]". In [4] it is stated that, generally, supplier selection is a multi-criteria decision problem [7], [8], [9]. The methods suggested in the related literature can be classified into two categories: Mathematical programming models and weighting models.

A supplier selection model based on support vector machine (SVM) is a mathematical approach by developing a selection model using a one-against-one algorithm calculating weighted requirements. It provides a fast and effective method for supplier management and avoids some unscientific traditional methods [10]. Once the requirements are weighted, the rest is done in a mathematically exact way. The weak point here is obvious: People, who are purchasing or managing experts, do the weighting by using a seven-point scale. No matter how experienced or full of knowledge these people are – the SVM mathematics input is only an educated guess. So the deceptive exactly mathematically calculated result should be regarded accordingly: As a derived guess. Nevertheless, SVM could point into the right direction, if it is combined with feedback mechanisms to the input factors and if multiple iterations towards an iterative result would be carried out.

Applying QFD in the early project stage of supplier selection eliminates these weak points of the 'traditional' approach: The rating and selection of the external IT projects partner is engineered.

Applying QFD in Supplier Selection

In this section, we explain how Quality Function Deployment (QFD), which has been successfully used multiple times to identify the true customer requirements in various industries [13], can also be used to select the most suitable IT Service Provider.

As a first step, QFD is used to analyze the goals of the development and for requirements engineering. Similar to the way QFD is used for requirements engineering during software development [11], QFD is first used to gather and to prioritize the solution-independent customer requirements. Compared to 'real' requirements engineering, the requirements gathered for the supplier selection are less detailed, but comprise two additional groups of requirements: Requirements on the service provider itself and support requirements. In total, the following groups of requirements are identified and prioritized:

- Functional requirements: This group contains the functionality, in this case the management accounting and corporate planning functions, benchmarking and industry comparison, but also file handling (import/export/saving data) and printing
- Technical requirements, i.e. the non-functional requirements: The quality attributes defined in ISO-9126 [14], but also requirements on the hardware and software platform to be used
- Requirements on the service provider itself: Factors like experience of the provider with Internet-based applications, customer references etc. were also taken into account
- Support requirements: Support, documentation, online help and training.

These requirements are then compared and matched against potential attributes of the IT service providers and their proposed solutions. To achieve this, a matrix was created displaying customer requirements and potential solutions. These potential solutions form the basis for the Request for Information (RFI) that is sent to the IT Service Providers. In the next step, the market for IT Service Providers is analyzed to identify potential partners. As described, several sources of information can be used to identify potential partners. In order to make the process manageable, the requirements identified are used to narrow down the number of potential partners. The RFI that had been prepared using the requirements is then sent to them. Since the questions in the RFI are based on the goals and requirements that were identified, and as correlations between requirements and possible solutions have been determined, each question has a specific weight. This weight is then multiplied with the degree of fulfillment, and for each provider the sum of the weighted degrees of fulfillment is calculated.

To improve the validity of the selection, a Request for Quotations (RFQ) is then sent to the providers, and the providers are invited to present their solutions in a so-called "beauty contest". During the beauty contest, each provider has to present his or her solution and has to answer additional questions. The information and impressions gathered during the beauty contest are then used to evaluated the RFQ and determine the most suitable IT service provider for the project. Definition and monitoring of Service Levels is also supported through the requirements defined in this process. Figure 1 provides an overview of the process.

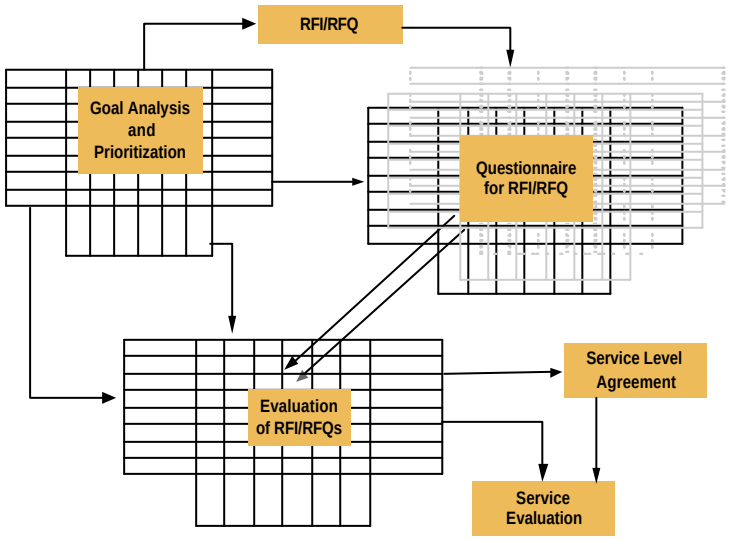

Figure 1: Overview of the process

Further use of QFD within the project

Using QFD for requirements engineering provides a proven way of prioritizing, weighting and organizing. Decisions are traceable and the weighting of requirements is most objective [11]. Thus, the functional and technical requirements gathered and prioritized during the supplier selection process, are used as a starting ground for the development of the software.

The development of new releases is also simplified by using QFD, e.g. the existing matrices can simply be extended with new requirements while existing requirements stay included. Re-weighting etc. is done by taking into account all information. No contrary, similar, double or otherwise unnecessary development will take place and the view is of the whole picture is kept any time.

QFD also takes care of including all potentially involved parties of the project (e.g. users, customers, developers, marketing, stake-holders etc.) into the engineering process and QFD ensures the distinguishing between requirements and suggested solutions.

Case Study: 'Chefplan Online'

The German consulting firm BBE Handelsberatung is specialized in consulting retail industry. One of the services offered is Excel 'Chefplan', an easy-to-use but fairly sophisticated tool for management accounting and corporate planning that is based on Microsoft Excel. The term 'Chefplan' is composed of the German words 'Chef', which means the person being in control, and the word 'Plan', which has (here) the meaning of being the strategy and being the controlling tool. About 2000 small retailers in Germany successfully use Excel Chefplan. Encouraged by the positive feedback that many users provided, BBE decided to develop an Internet-based version of Chefplan: Chefplan Online. Chefplan Online would be provided to its users through the Internet in the way of Application Service Providing (ASP, [12]). The customer interacts with ASP software through an Internet browser; the application itself runs on a remote host belonging to the ASP provider.

This Internet-based version would have the following advantages: First of all, if the retailers entered their data, it could be analyzed and industry averages and benchmarks could be provided to all users, providing important feedback for the users. Secondly, since the Excel-based version is basically an advanced Excel-Macro, program updates are rather difficult to administer, whereas the Internet-based version would be easily updated for all users at the same time by simply updating the software on the server. Finally, Chefplan Online would provide regular revenues (monthly usage fees).

The only problems for BBE were that neither they were specialized in software development, nor were they specialized as an Internet Service Provider or Hosting Company. Therefore they decided to have Chefplan Online developed and hosted by an IT Service Provider. And to ensure the selection of the provider was professional, they decided to hire the authors to assist in the selection. BBE was sure that the basis for Chefplan Online was simply porting the Excel-based Chefplan to the Web, and they were sure that they wanted to provide benchmarking and industry comparison features. But they were not quite sure whether that was all they wanted to change. Using QFD, answering these questions proved not to be a problem, since we included these in the goals and requirements used in the process. Figure 2 shows an excerpt of the goal analysis used to prepare the RFI.

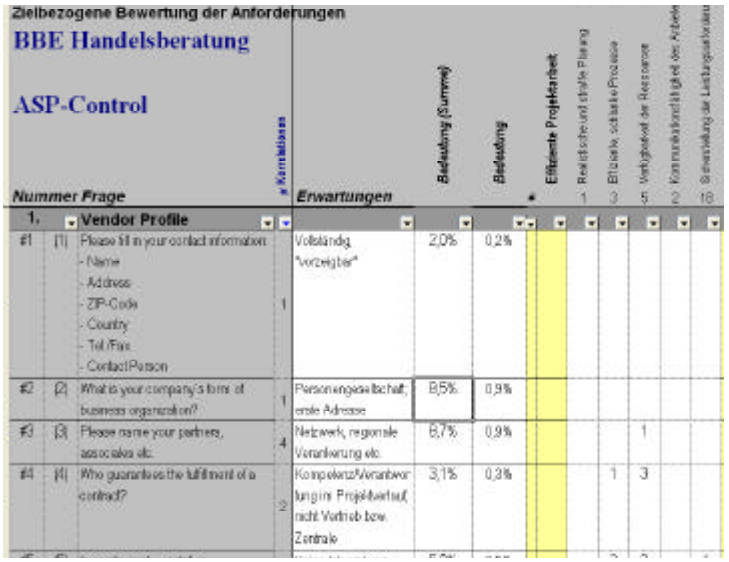

Figure 2: Excerpt of the goal analysis

During market analysis and the first rough evaluation of potentially suitable IT service providers, the selection was narrowed down to seven, to which the RFI was sent. The RFI consisted of about 200 questions, each of them directly relating to a requirement identified in the previous step. Some examples are:

- Do you commit to a response time for online clients (<=2 seconds for update transactions)?
- How are backups done: online, incremental, full, other. Please explain your backup concept.
- Please name your references in Germany: In which market are they and how many customers do they have?

Others can be seen in Figure 2.

The analysis of the answers to the RFI leads to the scores shown in Figure 3.

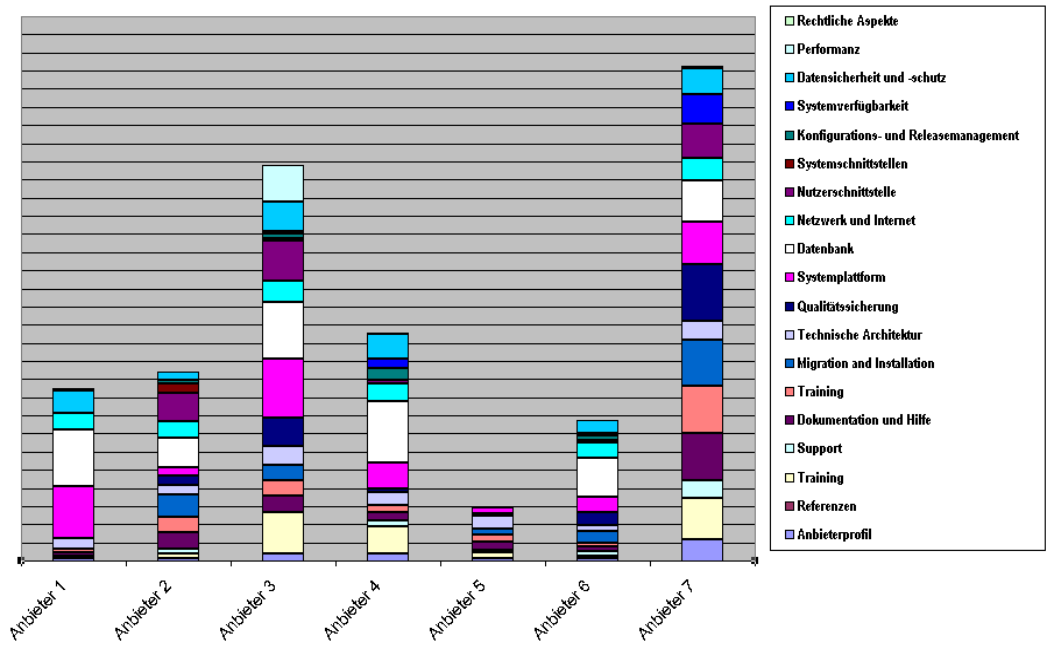

Figure 3: Comparison of the suppliers' scores

Following the analysis of the RFI, a Request for Quotations (RFQ) was sent to the providers. The providers were invited to present their solutions in a beauty contest. The authors evaluated the RFQ as well as the impression that the providers left during the beauty contest and gave their recommendation to BBE.

BBE selected this recommended IT Service Provider, and all three parties (BBE, the provider and the authors) met for another QFD-workshop to finalize Chefplan Online's specifications (the workshop followed the procedure described in [11]). Using these specifications (that were based on all the requirements identified and prioritized during the QFD-workshops), the provider developed Chefplan Online.

The application has been successfully in use for quite a while now and can be found on the Internet: http://www.fit-for-business.org.

Conclusion

This Case Study shows that the application of QFD for selecting external IT Project Partners fits perfectly in into overall project management of projects that involve external IT Service Providers.
Not only technical facts can be QFD engineered – issues or requests about the potential partner companies themselves can also dealt with: Their potential, their creditability etc. Even some of the so-called "soft factors" can be taken into account.

The decision for the selected IT Supplier becomes traceable, measurable and provable.

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His PhD thesis will be in the field of IT-Contracting, Outsourcing and QA-/IT-Project Management with external service providers. In1994 he got a Master's degree in computer sciences from the Universität Stuttgart. He worked for several companies developing software, doing IT-project management and with technical Presales in Germany and Ireland – there being Managing Director of the Irish unit of a German a software manufacturing company. Before joining Prof. Dr. Georg Herzwurm's department in 2005, he was in charge of purchasing customized embedded software for two production sites of one of Germanys biggest automotive and electronics industrial companies.

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Dr. Georg Herzwurm is a Distinguished Full Professor and holds the Chair for Business Administration and Information Systems, esp. Business Software at the University of Stuttgart, Germany. He studied Computer Science and Business Administration at the University of Cologne, Germany. Besides his university career he takes an active part in the development of QFD methods. He is founder and speaker of the board of the German OFD Institute (QFD-ID). He is responsible for the organization and management of the annual symposium as well as about the study group 'QFD in software development'. Since 1997 he represents German interests in the International Council for QFD (ICQFD). 2000 he received the international Aka-Prize for outstanding contributions to the further development and support of the Quality Function Deployment method. 2001 he was awarded with the honorary membership in the Iran Institute of Industrial Engineering (IIIE) by the Amirkabir University of Technology, Teheran, Iran.

Prof. Dr. Wolfram Pietsch

Dr. Wolfram Pietsch is a senior professor for Business Management and Information Systems at the Aachen University of Applied Sciences. He is co-founder and member of the board of the QFD-Institut Deutschland and has been pioneering the introduction, Adaptation and Enrichment of QFD in business and research since the early nineties. His current research concern is the employment and integration of QFD for business management, i.e. Project Management, Marketing and Strategic Planning and its tailoring for different industry branches. Dr. Pietsch is responsible for the certification initiative at the board of the QFD-Institut Deutschland and head of the certification board.

Dipl.-Math. Peter Brandenburg

He studied Mathematics, Computer Science and Economics in Bonn.
He began his career in 1981 at the Mannesmann GmbH as project manager and as leader of the ESPRIT-Project "Konfigurations- und Versionsverwaltung". Afterwards he led the division UNIX-operations and product administration at Mannesmann Kienzle. From 1994 on he was responsible for quality assurance and project management. Since 2002 he has been supporting project portfolio management for all projects at Vodafone D2 GmbH.

During all this time he has been using QFD in different variations for decision-making.