A Systemic Approach for Evaluating and Developing IT Outsourcing Measurement Systems

Hannu Kivijärvi
Aalto University School of Business
hannu.kivijarvi@aalto.fi

Jussi Toikkanen
Accenture Finland
jussi.toikkanen@accenture.com

Abstract

In this paper, we examine IT outsourcing measurements systems. We propose a systemic framework which can be used to support existing evaluation and the development of new measurement systems. The framework provides a structure for the comparison of all system elements, namely input, measurement process, and output. It also serves as a tool for proper comparison of alternative measurement systems.

The proposed approach is applied in a multinational corporation operating in the electronic industry and conducting global business. First, the characteristics of the previous measurement system are evaluated, then the systemic properties of the current system are assessed, and, finally, a new measurement system is proposed. When we compared these three measurement systems, it became clear that they differ strongly in terms of inputs and outputs as well as the measurement processes.

1. Introduction

Outsourcing of information technology has been a growing trend in recent years. IT outsourcing (ITO) refers to the use of a third party vendor to provide IT services which were previously produced internally [9, 14, 15]. Essentially, the profitability of outsourcing is grounded on vendors’ cost advantage based on economies of scale. Companies acknowledge the possibility of accessing various benefits and savings when outsourcing a particular IT task or the whole in-house IT organization to an external service provider. Such benefits could include cost savings, access to newer technologies, and access to talented workforce, to name a few. On the other hand, there are also many risks and downsides involved in outsourcing. These could include contract risk, future price risk, transaction costs, and loss of knowledge in the organization [5, 21, 23, 26].

The focus of previous ITO studies has varied from outsourcing reasons to long-term outcomes, from highly technical aspects (e.g. cloud computing) to psychological features, and from client perspectives to supplier viewpoints. These studies provide insights into the outsourcing decisions, criteria used, savings achieved, productivity impacts, governance process, contract structures, risks involved, etc. [6, 11, 13, 24]. Although some case studies have addressed the problems involved in measuring ITO, relatively little attention has been paid to the longitudinal evolutions of the whole measurement systems used to evaluate ITO actions. Studies describing and explaining the development of measurement systems over time are lacking. However, in order to manage ITO processes successfully we need to know how and why measurement systems have changed in response to external and/or internal events. Because the environment of organizations changes ITO measurement systems cannot be permanently established.

Organizations as well as the academic literature have recognized the difficulty of measuring the value of sourcing work [30]. Yet such measurements are necessary to justify the work of the sourcing personnel. Unfortunately, although a large proportion of the academic literature acknowledges the difficulty of measurement it does not offer any solutions [4].

Some of the main problems which organizations have had with the measurement task are related to issues such as savings which are not seen on the bottom line and varying definitions of what savings actually are. These exemplify what makes this measurement task difficult in real life. Inappropriate measurement systems might also develop incentives which harm the overall competitiveness of the sourcing organization [3, 17].

Although the measurement task has been seen as a complex matter, some studies offer solutions to the problems of savings measurement. These solutions range from the total cost of ownership perspective to savings categorization and visibility in the metrics used. Some savings can be calculated by, for example, comparing the newly negotiated contract with the prices of the previous year. On the other hand, soft savings which cannot be seen as a change in budget are much more difficult to quantify [3].

In this study, the current knowledge of measuring ITO value is extended. In Section 2, we conceptualize IT outsourcing and particularly the respective measurement systems. We rely on the general systems approach and the following key concepts: input-process-output, environment evolutionary systems, elements, hierarchy, system state, system attributes, and synthesis. In Section 3, the research framework and research methods are described. The framework captures the evolution of three different kinds of measurement systems in the case company described in Section 4. First, this study explores the old and well-defined measurement system. Second, it introduces the current measurement system which replaced the old system. Third, on the basis of experiences achieved and requirements determined it introduces an alternative, multilevel measurement system which can be applied even in contexts other than the case company.
2. Theoretical background to measuring IT outsourcing

Outsourcing is a situation in which a company or other organization decides to buy a certain activity which was previously done in-house from an outside service provider [21]. The outsourcing company might discover that the other company is, for example, more competitive, efficient, and innovative than the in-house service provider.

2.1 Theoretical explanations of outsourcing

Organizational drive for outsourcing is usually analyzed by referring to theories such as resource dependence theories and transaction cost economics (TCE). Theories about resource dependence are based on the idea that a company is a combination of various resources. In order to create competitive advantage through the extensive use of resources, a company might need to rely on outside vendors to provide extra capabilities and resources. This view supports the notion of acquiring resources complementary to the existing ones, instead of total outsourcing [12]. Also, according to Espino-Rodríguez and Padrón-Robaina [10], a company’s performance and competitive advantage depend on its resources. These resources can be both tangible and intangible. Outsourcing can be seen to affect the firm’s boundaries, as it determines the resources available to different business units. The resource-based view (RBV) is closely related to the idea of maintaining the core competences within the company and outsourcing the rest. RBV can explain how the organization can tap into the necessary resources of outside service providers with the use of agreements and without having to shift the boundaries of the organization. These resources should also be unique in order to be able to create true competitive advantage for the company. In other words, the resources should be rare and not easily accessible to other companies.

Transaction cost economics, on the other hand, is based on the idea that there are costs in using an outside service provider. These extra costs come from activities such as contract creation, search costs, etc. [12]. More importantly, in terms of transaction cost economics, a company needs to analyze which sourcing option is the most economically feasible in order to minimize transaction and production costs. It can do this by calculating the various transaction costs on top of the actual production costs and then comparing the alternatives. When it comes to outsourcing, companies can often lower the production costs by utilizing the economies of scale of the service providers. On the other hand, the use of an outsourcing option often raises the transaction costs. It should also be noted that the level of transaction costs is affected by asset specificity, uncertainty, and frequency of occurrence [28].

Despite their slightly different views on outsourcing, these two theories can be seen to affect the company’s boundaries when it comes to special resources. TCE suggests that when outsourcing specific and rare resources, the vendor might resort to the threat of future price increases and termination of the contract by resorting to the negotiation power it has after the contract has been signed. The extra work which is needed to address this risk could raise the transaction costs considerably. Despite the differences, these two theories complement one another in the analysis of outsourcing.

2.2 Outsourcing information technology services

IT outsourcing has grown into a multi-billion dollar business. Despite the varying opinions, IT outsourcing has developed into a global business phenomenon which is not likely to diminish. Researchers have dedicated much time to analyzing the various issues around IT outsourcing [4].

Cederlund et al. [5] suggest that companies have managed to achieve better efficiency when they have outsourced their IT services. Yet companies are becoming more and more interested in other benefits than just cost savings or improved efficiency. They also seem to chase other attributes such as better ranges of services when outsourcing information technology. On the other hand, when outsourcing, companies have to take into account the risks involved.

Ranganathan and Balaji [25] found examples where great cost savings were realized. At the same time, some companies were still disappointed with their results. According to the authors, this is because the critical capabilities for outsourcing activities within the organization were lacking. Cederlund et al. [5] highlight that IT outsourcing should be looked at from the perspective of remote labor outsourcing rather than purely technical issues. Metters et al. [21] argue that technical tasks such as code writing by companies in India have yielded positive results in terms of quality and timeliness.

Cox et al. [7] showed why companies chose a long-term supplier relationship strategy for 88 percent of their information technology spend. This meant that most of the IT spend was not managed on an ad hoc basis but rather through carefully selected suppliers. Davis et al. [8] showed the various kinds of IT related activities which are being offshored. The list consists of activities such as call center activities, programming, software testing, research and development, and also more difficult activities such as product development and software architecture design.

A proper outsourcing arrangement depends on the maturity of the organization [26]. The various arrangements range from strategic partnership to transaction exchanges as the maturity of the organization increases. In a strategic partnership, the vendor may help the outsourcing company to reach better standardization, as in transaction exchanges the company purchases a total service package from the vendor. According to a survey the latter method was found successful in 90 percent of cases [26].
2.3 Perceived difficulties in measuring ITO performance

Managing ITO activities is difficult and controversial, as they are intangible and risky, and failures can cause serious problems throughout the organization. A research question suggested by Hui and Beath [16] is how the outsourcing company measures the value of the sourcing decision. Organizations have difficulties in measuring actual savings, outsourcing success, business values, real costs, and benefits [4, 20, 30, 31]. Difficulties in quantifying indirect or hidden costs, an insufficient base for comparison, contradictory criteria, absence of standardized processes, etc. make the measuring effort difficult and challenging, if not impossible.

In addition, the decision-making situation has a number of uncertain elements. Decision-makers cannot neglect the risks involved, but neither can they ignore the opportunities made available. According to Nieroda [23], when calculating the cost of outsourcing, the risk factors need to be taken into account in assessing the true cost of outsourcing. Also, Klepper and Jones [18] recommend quantitative estimates of possible risks and the costs of risk management. Such estimates should then be counted as costs in the calculations.

There are several methodological challenges such as the choice of a proper unit of analysis which make this success measurement task difficult [4]. Commonly used company level performance measures like ROI fail to take into account aspects such as better organizational efficiency. There are intangible benefits which can be realized on the operational level but not on the financial level. Wang et al. [31] also conclude that many information technology outsourcing benefits are materialized on the process level only.

One potential source of and a reason behind measurement difficulties may be the deficient frameworks offered by academics. Blaskovich and Mintchik [4] argue that researchers have long had problems in measuring IT outsourcing success and providing empirically tested frameworks. In the following, such a framework is proposed and empirically evaluated.

3. Research framework and methodology

3.1 Key concepts of performance measurement systems

The terminology of systems theory has developed from the terms of biology, physiology, and electrical engineering but has been applied in a wider scientific context. The idea of general systems theory is to develop interdisciplinary theories so that, if correct analogies are made between the systems of different disciplines, the theories, concepts, models and methods can be “transferred” from one discipline to another and generalized.

There are different ways of defining a system. Briefly, we would suggest that the system is composed of related elements. The elements can be material objects, human subjects, and abstract concepts. The state of a system is a set of relevant properties. Any system has an unlimited number of properties [1, 2]. A system is defined when its elements and the possible combination of their states are determined. Everything which is identified separately but not included in the system is termed environment.

An input-output system is determined when the terminal input and output elements and the possible combinations of their states are given. The input elements are induced by the environment and the output elements act on the environment. The various states of output elements are determined by the states of input elements.

Certainly, there are external relations between the system and its environment as well as internal relations between the elements. A system is open if it has relations with the environment; otherwise it is closed. The set of all relevant relations is called the structure of a system [19].

Sometimes the elements and relations between them can also be observed or measured at an increasingly detailed level, that is, decomposed into simpler elements and relations, and the result can be viewed as a system. This allows us to assume that the system is composed of subsystems. Moreover a system itself can be an element in a larger system called a total (whole) system. Thus, there can be a hierarchical structure between total system(s), systems, and subsystems.

Usually, the depth of the decomposition across the hierarchical structure is arbitrary. There is no specific “stopping rule” to indicate the end of the decomposition process, but finally, largely for practical reasons, the manageable basic (elementary) elements and their states are reached. Any change in the system state is called the action of a system and a series of actions during a time period is called the process of a system. The changes in the system structure can be continuous, evolutionary, or sudden, i.e. revolutionary. The key concepts of the systems approach are identified in the first column of Table 1.

Generally, a measure is a metric which records an observable value like performance. A performance measure is a metric used to quantify the efficiency and/or effectiveness of an action [22] and performance measurement is the process of quantifying actions. A performance measurement system is a set of related metrics used to quantify the efficiency and effectiveness of actions. Performance measurement systems have traits like those of systems in general and they are described in the second column of Table 1. Next, we are interested in the characteristics of ITO performance measurement systems illustrated in the third column of Table 1. This systemic framework can be used to evaluate old and develop new ITO systems. The framework provides a structure for the comparison of all system elements, namely, input, measurement process, and output. It also serves as a tool which allows proper comparison between the alternative measurement systems. Next, special attention is paid to the hierarchical goal structure of the ITO measurement system.
3.2 Hierarchical goal structure

In the organizational context, work is typically divided into different divisions, departments, groups or teams, who usually work towards their own goals and compete with each other for common resources, recognition, rewards, etc. However, intergroup relations and cooperation between units are prerequisites for organizational effectiveness. Because we cannot eliminate departments, groups, or other units, we must align the groups toward a higher-order, common goal. In the psychological literature, such goals are called “superordinate goals” [29]. “Superordinate goals are goals that get people from opposing sides to come together and work toward a common end result” (Psychology Glossary). Superordinate goals aim at a higher purpose than any one group, and so align all groups to that purpose by giving each a common goal. Every time there is a conflict between groups, each group has to go back to the superordinate goal to make choices. In addition to conflict resolution in psychology, the concept of the superordinate goal is applied to a wide variety of scientific inquiries, e.g. in economics, marketing, project management, and product development.

The superordinate goal can be divided into lower-level goals, each of which still serves as an upper goal for some lower-level organizational units or processes. Therefore it is consistent and fair to suggest that the goal space in the organizational context is structured hierarchically, with the superordinate goal at the top and the goals of groups, processes, or even individuals at the lowest level.

In addition to values, the goal structure may reflect organizational structures (designs), business strategies, and environmental characteristics like uncertainty and risk. The goal structure forms a means-ends relationship between IT sourcing alternatives and business performance, be it business value or other success measure. Although the goal structure may reflect a number of things and it may be presented by a number of means, it is basically a mental construct which guides human actions in the organizational context.

As a technical mean, the analytic hierarchy process (AHP) [27] was used in the case project. By means of AHP, it is possible to structure the decision problem into a hierarchy which reflects the values, goals, objectives, and desires of the decision-makers. This study combines the concepts of AHP and benefits, opportunities, costs and risks analysis (BOCR) while taking into account their division into certain and uncertain elements. First, the ITO business value is divided into these two groups, certain and uncertain. Benefits and costs are attributes which will certainly happen whereas opportunities and risks are attributes which could be expected to happen. This initial split divides the hierarchy into two separate sub-hierarchies of certain and uncertain with only the total business value as a common denominator.

The next step is to divide the different outsourcing value criteria into the four categories of benefit, opportunities, costs, and risks. The first category of benefits includes sub-criteria which could be considered to have a monetary effect on the company, either directly as cost savings which affect the budget or soft savings or cost avoidances which over time lead to concrete monetary savings. They can be considered certain benefits of the outsourcing decision but whether the actual monetary savings can be calculated depends on the measurement system in use. The second category of costs includes negative items which will increase the total costs of the outsourcing venture. These aspects should be minimized to achieve the best possible total value. These two categories of benefits and costs consist of criteria which can be seen to affect the outcome of the outsourcing process.

The third category of opportunities resembles those criteria which do not have a direct monetary effect but may enhance the performance in other ways by, for example, improving processes. The company could obtain better

| Table 1. Research framework: System concepts, measurement system, and examples in ITO Context |
| System concepts | Concepts of measurement system | Examples of concepts in ITO context |
| System | Measurement system | ITO measurement system |
| Element at a given level | Single measure at a given level | Benefits, opportunities, costs, risks |
| Attribute (property) | Property of a metric: mean value, deviation, actual value, desired value. | Mean ITO costs, desired soft savings |
| State = a set of all relevant attributes | A set of all relevant measures with values | Actual hard savings = x €, desired soft savings = y €, switching costs = z € |
| Relations between elements | Relations between single measures | Hard savings > switching costs, total costs = costs of outsourcing + hidden costs + vendor monitoring costs |
| Environment | Measures outside the measurement system | Corporate sales, number of customs |
| Input | Inputs to the measurement system | Bills from vendor, contracts, evaluations |
| Output (outcome) | Outputs from the measurement system | Cost data, arguments for decisions |
| Goal = Preferred outcome | Preferred values of output measures | Hard savings = max, Total costs = min |
| Process | Conversion of inputs to outputs | Computations from inputs to outputs |
| Subsystem | Part of the measurement system | Benefits, costs, risks, opportunities |
| Hierarchical structure | Hierarchical relations between measures | Benefits consist of hard savings, soft savings, cost avoidance |
| Change | Transformation of system structure, evolution, or revolution | Adding new metrics to ITO measurement system |
| Synthesis = deduction of the whole from the parts | Deduction of the upper level measures from detailed measures | Total outsourcing benefit = f (certain outcomes, uncertain outcomes) |
knowledge through the outside service provider. The last category of risks consists of criteria which might increase the total level of risk which the company is taking and therefore they should be minimized to obtain the highest total value. These two groups consist of elements which might or might not be realized during the assessment period when the total value of the outsourcing decision is estimated.

The measures behind those four classes of value in the academic ITO literature were investigated next. In summary, the logic used in the measurement hierarchy with respective references can be seen in the graphical presentation in Figure 1. This hierarchy is used in Section 4.3 where the new multilevel measurement system concept is put to the case organization.

4. Case analysis

The case company is a multinational corporation which conducts global business. The branch of the company is an electronics industry and the company has multiple divisions which have slight differences in terms of business fundamentals, organization, and the information systems used.

The data needed to evaluate the measurement systems were gathered from three in-depth interviews. The interviewees were the Head of IT Outsourcing (H-IT-O), the Head of IT Consultancy Services Sourcing (H-IT-CSS), and a Senior Line Manager (SLM). In addition to face-to-face interviews, the research group obtained a lot of the case company’s internal materials which were used to guide the employees on using the value measurement systems. In order to recover the most important elements from the data gathered, this study used thematic networks as an analytical method. In thematic networks, the textual data are gathered into different levels which eventually form a mind map for analyzing the data and finding the important themes.

4.1 Evolution: Previous value measurement system

The case company used two different systems to measure outsourcing value. The original value measurement system evolved over time and it became complex in the end as new ideas and rules were constantly being added to make it more comprehensive. Finally, it became quite a bureaucratic system. These changes and increasing complexity resulted from several factors. The staff in the finance department changed frequently and new people had their own opinions about the measurement process. Also, some of the sourcing managers wanted new metrics to be added in order to make it easier to report savings. All these changes increased the complexity and eventually led to a situation where sourcing managers found the system difficult to use. They often had questions concerning what could actually be claimed as value (H-IT-O).

In this original system, the savings were first reported within the following hierarchical categories: price reductions, cost avoidance, specification changes, and revenue generated. The price reduction resulting from the sourcing work had three different kinds of definitions explaining three different situations. The first situation was where similar services have been previously used. In that case, the savings were calculated by subtracting the finally agreed price from the current price. On the other hand, if the service had been sourced recently and not used previously, the price reductions were calculated by subtracting the finally agreed price from the lowest comparable bid from the initial request for a proposal round. Finally, if the service was newly sourced and there was only one supplier bidding, the price reduction was calculated by subtracting the finally agreed price from the second bid in the initial request for proposal.
In this value measurement system, cost avoidance was defined by resisting price increases. Value could be claimed if the sourcing manager was able to avoid the price increase which the vendor was proposing. In order to claim such value, supporting documents were required. Specification changes were defined by a change which was initiated by the indirect sourcing unit, which is the unit responsible for the sourcing of products and services for internal use. Also in this case supporting documents and justifications were required. Finally, revenue generation was defined by value generated from the sales of unused assets.

In addition to those four value categories, a number of new value-added activities were included in the system. In this expansion of the measurement system, a new category of risk mitigation was added. It included activities such as environmental and sustainability issues, IPR management, brand protection, and contract liability mitigation. Another category of value-adding activities which was included in the system was called value management. It included elements like innovative solutions, increase in active users, time to market, and consumer relationship building.

According to the interviewees, this original system had many disadvantages. At one point they were able to claim value only up to the first year. It was highlighted that this was poor practice as there were often some initial investments during the first year which enabled savings to be realized in the years after that. In this old system the savings also needed to be validated with evidence on a quarterly basis. The sourcing finance sent a questionnaire which was filled out in order to validate the savings which were put into the system. The evidence was then gathered by obtaining statements from stakeholders, comparing the agreements with the purchase orders, etc. In the end, this resulted in a considerable amount of overheads and extra work (H-IT-CSS).

Even though the old, bureaucratic system was much criticized and it caused a considerable amount of work, the actual decision to reject the original measurement process occurred naturally through organizational changes. The system was originally designed only for the indirect sourcing organization and thus when it was merged with the direct sourcing organization it was a natural corollary to let go of the old process which would not have been suitable for everyone in the new sourcing organization (H-IT-O).

4.2 Revolution: Current value measurement system

In the new system, the complexity, that is, elements and relations between them, has been reduced significantly. It is only a single-line system where the estimated amount of savings in euros is put and then the certainty of the realization of those savings is estimated on a scale of zero to 100 (H-IT-CSS). Not all of the cases are put into the new system because of sensitivity issues as, for example, personnel reductions contribute much to the acquired savings. In fact, one of the respondents said it is totally up to him what is put into the system. The current system is able to take into account savings for the next five years by splitting them up into quarterly savings (H-IT-O).

The current system is a lighter version than its predecessor but it certainly has its own issues. As the metrics are not as clearly defined and there are no specific rules of what constitutes savings, people have had questions about what to put there. One of the interviewees said that he does not want to ask for guidance on these issues, as he was sure that he would get what he was asking for and that would lead to a situation where the complexity would build up again. It is a value measurement system but it is used more to look at the kind of cases people are working on (H-IT-O). Currently, there are no general guidelines on the use of the new system. Therefore the team which was interviewed still used four original value categories in order to have some guidance on what to put there (SLM).

The simplicity of the new system has also changed the way people look at the business value created. Instead of relying entirely on a measurement system, they consider some measures outside the system (environment): the current method of measuring the team itself is to look at savings in the operational expenses. The focus has shifted towards bringing down the operating expenditure of the IT business unit and this is in line with the strategic goals of the company in general. These new strategic changes also launched the fusion of two sourcing organizations and led to the decision to abandon the original measurement system. The operating expenditure of the sourcing organization needed to decrease as well. With this new focus on lower operating expenditure, one way to measure the value created was to compare the business unit’s operational expenses before and after the switch.

Measuring the value of outsourcing has also changed because of the new focus on large-scale IT outsourcing cases instead of small incremental changes. These recent cases are not ratified by any value measurement system but rather by presenting the total cost of ownership (TCO) figures straight to the management board. Instead of using value measurement systems to justify the work of the sourcing organization it was highlighted by one of the interviewees that it is important to have a close connection with senior management in order to obtain the necessary stakeholder buy-in for sourcing projects (H-IT-O). Trent and Monczka [30] also had similar concerns about the stakeholder buy-in.

The calculation of the TCO has been easy in recent cases, as the company outsourced specific operations to an outside vendor. This has inflicted a clear cut on the business unit budget. This particular company has an advantage, as it has a long history of measuring everything and thereby figures such as cost per employee, cost per application, cost per office space, etc. are easy to obtain from the HR department. The availability of such figures and the fact that the recent IT outsourcing cases are such straightforward cuts has made the value measurement much easier. Nevertheless, the interviewees highlighted that they were no longer worried about the exact figures but satisfied with
approximate figures and it would be no big deal if the estimates were off by a couple of million (SLM).

Even though the savings from these recent IT outsourcing cases had been created in conjunction with the business units, it was still somewhat unclear how the estimated savings could be verified once realized, if anyone asked. One of the respondents rationalized that some of the savings could, for example, be estimated by looking at the past spend figures: in other words, how much money they spent on the 30 vendors they used to have, compared with the expense situation where there was only one vendor. The difference between the outlay on these 30 vendors and that on one vendor forms a part of the actual monetary savings in this case (SLM). As they no longer rely on the previous measurement system and its validation processes, many of the estimations are based on individual opinions.

Even though the case company ended up giving away a well-defined measurement system, the head of this team stated that the sourcing organization and its performance should be measured and looking at the actual savings is the easiest way to do that. When it comes to measuring the performance of the sourcing organization, it should be highlighted that the work of the sourcing managers is not only about creating savings which can be measured. They might, for example, work hard on a frame agreement, which does not yield any concrete monetary savings but is still very valuable work. A lot of time goes into supplier management, as well (H-IT-O).

Estimating how many of the reductions in the business unit’s operating expenditure were really achieved by the sourcing organization is still an open question. Much of the work in these recent cases has been done in cooperation between the sourcing team and the business unit and therefore only some of the tangible savings could be claimed by the sourcing organization. This is usually solved on a case-by-case principle in large-scale projects (H-IT-O). Similar concerns about the division of achieved savings between participating business units were also presented in the literature reviews by Ashenbaum [3] and Johnson and Leenders [17].

The overall value of the sourcing work comes from several tangible and intangible elements so total accuracy is impossible, but the sourcing unit is currently satisfied with rough value metrics. Sometimes these savings are difficult to verify as the money saved by the sourcing work is often used in other IT investments. The business units may be reluctant to flag the amount saved, as the money is often needed in other investments. In general, the business unit leads are not too happy when their budgets are cut (H-IT-CSS). This is another fact that makes it difficult to pinpoint the value created by the sourcing organization, especially in the case where no proper validation is done.

### 4.3 Proposed multilevel measurement system

Two different value measurement systems developed in the case company were evaluated above. The measurement systems were evaluated by the system concepts described in Section 3.1. Next, a new multilevel system is developed for the case company. The proposed system is based on the general evaluation framework suggested in Section 3.2. The necessary data (pairwise comparisons) were collected during the three interviews discussed earlier.

#### 4.3.1 Data collection and criteria evaluation

After determination of the goals and goal hierarchy, the relative importance of the lowest-level goals with respect to the next-level goals were evaluated as well as the relative importance of each detailed goal to the goal at the next higher level. Evaluation applied the principles of AHP and pairwise comparisons.

After all paired comparisons had been made, it was possible to rank the outsourcing criteria for each interviewee (Columns 2, 3, and 4 in Figure 2). As expected, hard savings were clearly the most important criterion (attribute) although there were significant differences between interviewees. The head of the IT outsourcing unit seemed to give more value to other criteria than the head of the consultancy services sourcing unit. It should be noted that the answers of the interviewees differed to one degree or another. An example where opinions were completely contradictory is the comparison between improved processes and better quality.

#### Figure 2. Importance of outsourcing criteria

In columns 5 and 6 the combined values of each criterion are given. In column 5, the geometric means of personal importance are calculated but in column 6 the geometric means are calculated at the lowest level of pairwise comparisons in the hierarchy (Expert Choice software). These values are used in later analyses. From the graphical
presentation, we can see the chosen criteria in order of importance.

As expected, the hard savings of IT outsourcing were clearly the most important attribute. Also, other criteria such as cost avoidance and soft savings were considered important by the interviewees. The rest of the factors diminish in importance quite smoothly towards the last attribute and there are no dramatic differences between them.

Hard savings, which could be considered the attribute easiest to measure, are clearly ranked as the most important criterion. On the other hand, many other criteria which could also be considered easy to measure do not stand out in the final results. For example, one interviewee noted that the cost of outsourcing is fairly easy to measure as, for example, the rates of external lawyers which can be used in negotiations are well known (H-IT-CSS). On the other hand, loss of control, which could be considered fairly difficult to quantify, is ranked more important than the cost of outsourcing. Consequently, the measurability of the criteria does not seem to affect their ranking in terms of importance.

The validity of the most important IT outsourcing criteria can be assessed by sensitivity analysis. A considerable proportion of the weights for the individual criteria is determined by weights given by the interviewee to the question at the top of the hierarchy where s/he had to compare certain and uncertain elements. All of the interviewees prioritized the certain elements over the uncertain elements. The weights for the certain elements were 0.875, 0.833, and 0.750. The sensitivity analysis shows that had their answers been approximately 0.07 points more towards the uncertain element, the order of preference would have changed. The sensitivity analysis shows that the results are somewhat vulnerable to changes in the topmost comparison of certain and uncertain elements. On the BOCR level, the comparisons between benefits and costs and between opportunities and risks involve more rational decisions in that the answers can be explained by reference to company practices.

When looking at the output of the model, we can see that the interviewees prioritized the BOCR elements differently. The benefits were much preferred by the respondents and the linkage between the benefit elements and the certain elements resulted in a situation where three criteria under the benefit element were well represented in the final combined results. This clearly shows that the respondents valued the criteria which are measurable monetary criteria and are realized in sourcing cases with high certainty. Hard savings, cost avoidance, and soft savings are the criteria they preferred most. They are also criteria which they already have a history of measuring expertly. For hard savings and cost avoidance they had well-defined rules on how such values should be measured and reported. They also had a broad range of so-called soft savings which could be measured quite accurately. A good example was the ability to measure and report the revenue generated by selling used assets such as computers, which had a book value of zero.

On the other hand, it should be noted that on the BOCR level in the hierarchy the second most preferred element was risk. Two of the respondents strongly highlighted the importance of risks in IT outsourcing and the third respondent explained that it is more about the opportunities which can be chased with IT outsourcing. These two groups of risks and opportunities which were prioritized by the interviewees were not reflected clearly in the final results as they belonged in the uncertain element category. They did not stand out in the final results either because the interviewees did not completely agree on the question in the pairwise comparison as to which is more important, the opportunities or the risks of IT outsourcing. As the uncertain element was not much appreciated on the highest level of comparison, the individual criteria of those two groups did not stand out in the final results. This can be explained by the opinions of the interviewees in the qualitative part of the interview where they observed that something that was not guaranteed to happen should not be used in measuring the value of the outsourcing case.

It should be noted that the hierarchy is open to different interpretations. First of all, the definition of soft savings is quite vague and it could be assumed to include elements from the opportunities group, such as improved processes, if not explained thoroughly to the respondents.

### 4.3.2 Deciding between outsourcing alternatives

Next, it is demonstrated how the multilevel evaluation model can be used to decide between different outsourcing alternatives. For reasons of confidentiality, data in the following analysis have been changed.

In the analysis, outsourcing alternatives are joined to the hierarchy with combined values. There are three different vendor options if the company decides to outsource. These vendors are located in three different geographical areas in order to make enough difference between the alternatives. An Indian vendor might, for example, be able to provide much cheaper hourly rates but have a higher cost of outsourcing, higher contract risk, etc. compared with a Finnish vendor.

![Figure 3. Priorities of outsourcing alternatives](image)
After a pairwise comparison of these different outsourcing alternatives relative to the lowest level criteria, the final ranking of these alternatives can be synthetized (Figure 3). In this case, the best alternative would be to outsource the application development to an Indian vendor as s/he provides the best business value. This is because in this case it was clear the Indian vendor would be able to provide the largest hard savings. Hard savings have such a large weight in the hierarchy that, for example, the option of keeping the function in-house could not compete with the Indian vendor even though s/he was much more competitive in areas such as risks and costs. The original hierarchy also puts a high weight on certain elements.

5. Discussion and conclusion

This study has explored three different ways to measure IT outsourcing. The measurement systems were evaluated according to the systemic framework proposed in Section 3. In Figure 5, some key characteristics of these systems are summarized.

The three measurement systems differ on many levels. First, the input is different for each system. In the previous system, the input consisted of rough estimates done by the sourcing staff and proper documentation. In the current system, no proper documentation is required but the certainty of realization is evaluated. In the proposed system, the input consists of evaluation criteria which are used to create hierarchical relations between criteria and outsourcing alternatives.

In addition, the actual measurement process is different in each system. In the previous system, the measurement was based on various predefined criteria and value categories. These helped the personnel to come up with an accurate estimation of the value created. In the current system, no actual measurement is made, but rather the numbers inserted in the system are the output which it generates. The measurement process in the proposed system is quite different; the process follows the principles of AHP.

The output from these three different systems varies as well. In the previous system, the sourcing personnel were able to come up with relatively accurate figures whereas in the current system, the output is a very rough estimate of the value created. The proposed system creates weights for the chosen decision criteria as well as priorities for the outsourcing alternatives. In the light of these priorities the company can make well-justified outsourcing decisions. The final component is the sensitivities, which can be used to access the overall reliability of the results.

When we analyze the value measurement systems and their evolution over time, we can see that the case company experienced similar problems of increasing complexity to those facing the company in the research of Nollet et al. [24]. In both cases, the companies started with a simple measurement system and then added new categories and rules. Finally, the system became too complicated to operate.

Given the AHP results for the most commonly used IT outsourcing theories, namely, the resource-based view and transaction cost economics, it is somewhat surprising that individual elements such as the cost of outsourcing and focus on core competencies are not listed any higher in the final results. In RBV, one of the advantages of outsourcing is that the organization can focus its resources on its core competencies and find new resources. Therefore it was surprising that the possibility of accessing new knowledge
was rated as the least important attribute. On the other hand, when the importance of core competencies is examined in combination with access to new knowledge their combined ranking would reach sixth position. Summing up the numbers for these two attributes is justified, as they are both in the scope of RBV.

Transaction cost economics suggests that the company should resort to outsourcing when transactions are less expensive when created by the outside vendor. Therefore, transaction costs such as contract creation costs are important considerations in the outsourcing decision. Thus, the cost of the outsourcing element as an individual attribute has surprisingly little weight in the final AHP results. On the other hand, when the cost of outsourcing is examined from a broader perspective combining attributes such as the cost of outsourcing, supplier monitoring costs, and switching costs, the final ranking changes dramatically. With their combined importance these attributes would rise to second position in the final ranking.

The proposed system serves as a good alternative for IT outsourcing value measurement, especially through the contributions of individual attributes and their importance ranking. Ranking reflects the company preferences and thus gives proper guidance for outsourcing decisions.

6. References