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Measurement of Intangible Success Factors:
Case Studies on the Design, Implementation and Use of Measures



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Abstract

Intangible assets consist of the non-physical sources of value related to employees' capabilities, organizations' resources and way of operating and the relationships with their stakeholders. This thesis examines performance measurement as a tool for managing intangible assets. The concept *intangible success factors* refers to managerially relevant intangible assets and also to the activities related to improving or utilising the assets. Both types of intangible success factors have been considered important from the point of view of managing intangible assets. Managers consider it important to measure intangible success factors. However, they are experiencing difficulties in applying the measures in practice.

The objectives of this research are to determine how intangible success factors can be measured and what the main challenges are in measuring them. These questions were examined regarding three main phases of measurement. The first phase is the design phase, which consists of deciding what to measure and defining the measures. After the measures have been designed, they can be implemented. The implementation phase consists of putting the measures into practice by, e.g., developing information systems. The third phase is using the measures, which consists of, e.g., reviewing measurement results and making actions based on the results.

The research approach used was qualitative multiple case research. The measurement of intangible success factors was examined in three organizations, in which measures were first designed, then implemented and finally used. Three research methods were used in order to be able to study the different phases. Action research was used for the design phase, interviews for the implementation phase and interviews and a focus group for the use phase. The theoretical framework of the thesis is based on the traditional performance measurement literature and the more contemporary intangible assets literature. Both of these fields have produced various measurement frameworks that can be used for measuring intangible success factors. This research examined the measurement of intangible success factors from the perspective of the process of measurement, i.e. how the different phases were carried out.

The results suggest that the measurement of intangible success factors is in many ways similar to measuring any other success factors. However, some specific characteristics can also be identified. Many of the measures of intangible success factors are subjective, although objective measures are also used. The measures are often based on some relatively new management tools, e.g. a competency matrix, which provide the information needed. The main challenges in measurement are also related to these specific characteristics. The challenges include, e.g., finding the skill and time required to design subjective measures, the resources consumed by the development of data collection methods and the lack of sophistication of subjective measures that would allow focusing on improvement. The main contribution of the research is the detailed description of how intangible success factors can be measured and the identification of the specific challenges in the different phases of measurement.

Tiivistelmä

Organisaation aineeton pääoma koostuu ei-fyysisistä arvonalähteistä, jotka liittyvät työntekijöiden kyvykkyyksiin, organisaation resursseihin ja toimintatapaan sekä sidosryhmäsuhteisiin. Tässä tutkimuksessa tarkastellaan suorituskyvyn mittaamista aineettoman pääoman johtamisen välineenä. Käsitteellä *aineettomat menestystekijät* viitataan sekä johtamisen kannalta relevantteihin aineettoman pääoman tekijöihin että toimintaan, joka liittyy aineettoman pääoman kehittämiseen tai hyödyntämiseen. Näitä molempia aineettomien menestystekijöiden tyyppejä pidetään aineettoman pääoman johtamisen kannalta tärkeinä. Yrityksissä aineettomien menestystekijöiden mittaaminen koetaan tärkeäksi, mutta käytännössä mittauksen toteuttamisessa on koettu ongelmia.

Tutkimuksen tavoitteena on selvittää, miten aineettomia menestystekijöitä voidaan mitata ja millaisia haasteita niiden mittaamiseen liittyy. Näitä kysymyksiä tarkastellaan suhteessa mittaamiseen kolmeen vaiheeseen. Ensimmäisenä vaiheena on suunnittelu, jossa valitaan mitattavat asiat ja määritellään mittarit. Kun mittarit on suunniteltu, ne voidaan ottaa käyttöön eli implementoida. Implementointivaiheeseen liittyy muun muassa tarvittavien tietojärjestelmien kehittäminen. Kolmantena vaiheena on mittareiden käyttö, johon kuuluvat mitaustulosten seuranta ja toimenpiteiden tekeminen tulosten perusteella.

Tutkimus toteutettiin laadullisena case-tutkimuksena. Aineettomien menestystekijöiden mittaamista tarkasteltiin kolmessa organisaatiossa, joissa mittareita ensin suunniteltiin, sitten implementoitiin ja lopuksi käytettiin. Jotta edellä kuvattuja vaiheita voitiin tutkia, niiden tarkastelussa hyödynnettiin kolmea tutkimusmenetelmää. Suunnitteluvaiheessa käytettiin toimintatutkimusta, implementointivaiheessa haastatteluja sekä käyttövaiheessa haastatteluja ja teemahaastattelua. Tutkimuksen teoreettinen viitekehys perustuu perinteiseen suorituskyvyn mittaus -kirjallisuuteen ja uudempaan aineetonta pääomaa käsittelevään kirjallisuuteen. Molemmassa tutkimuskentässä on kehitetty useita viitekehyksiä, joiden avulla aineettomien menestystekijöiden mittaaminen voidaan toteuttaa. Tämän tutkimuksen näkökulmana on prosessi, jolla aineettomien menestystekijöiden mittaaminen toteutetaan; tarkastelun kohteena ovat siis edellä kuvatut mittaamisen eri vaiheet.

Tulosten mukaan aineettomien menestystekijöiden mittaaminen on monin tavoin samantyyppistä kuin muidenkin menestystekijöiden mittaaminen. Siihen liittyy kuitenkin myös joitakin erityispiirteitä. Monet aineettomien menestystekijöiden mittareista ovat subjektiivisia, mutta myös objektiivisia mittareita käytetään. Lisäksi mittarit perustuvat usein uudehkoille johtamisen apuvälineille, kuten osaamismatriisille, jotka tuottavat mittareiden tarvitseman informaation. Aineettomien menestystekijöiden mittaamisen haasteet liittyvät edellä kuvattuihin erityispiirteisiin. Haasteita ovat muun muassa tarvittavan ajan ja osaamisen löytäminen subjektiivisten mittareiden suunnitteluun, tietolähteiden kehittämiseen kuluvat resurssit sekä puutteet subjektiivisten mittareiden ominaisuuksissa, mitkä voivat vaikeuttaa niiden hyödyntämistä toiminnan kehittämiseen. Tutkimuksen keskeisenä kontribuutiona on aineettomien menestystekijöiden mittaamisen yksityiskohtainen kuvaus ja niiden mittaamiseen liittyvien haasteiden tunnistaminen.

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ABSTRACT

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1 INTRODUCTION

This chapter starts by introducing the research theme and presenting some of the research that has been carried out in the field. Then, the research problem, objectives and the limitations of the study will be discussed. After that the research approach chosen will be presented and justified. Finally, the structure of the whole thesis will be presented.

1.1 Identifying the research issue

An organization's intangible assets¹ consist of, e.g., the employees' competencies, the organization's relationships with customers and other stakeholders, its culture, values, image and management processes (see e.g. Edvinsson and Malone, 1997; Sveiby, 1997). They are important for many organisations, especially those operating in knowledge-intensive industries (see e.g. Stewart, 2001; Sveiby, 1997). It has been suggested that nowadays the importance of intangible assets for organisations is, in some cases, greater than that of the traditional physical assets, e.g. financial capital and machinery (Hope and Hope, 1998; International Federation of Accountants, 1998). Thus, also the management of intangible assets has emerged as an important practice and a research area (Lev, 2001, p. 17; Petty and Guthrie, 2000, p. 161).

Performance measurement is a traditional tool of management. According to Uusi-Rauva (1996a, p. 11), performance measurement can be used to motivate, emphasize the value of the factor that is measured, direct employees to do the right things, clarify targets, create competition and make it possible to use result-based compensation. It is possible to use performance measurement also as a tool in managing intangible assets (see e.g. Edvinsson and Malone, 1997; Lev, 2001; Mouritsen et al., 2003a; Sveiby, 1997).

According to Marr and Gray (2002), the main causes for measuring intangible assets are related to an organization's internal and external factors. Internal factors include strategy formulation, strategic management, benchmarking, compensation and motivation. External

¹ Intangible assets and intellectual capital are considered here as synonyms. They are defined in Chapter 2.

factors include the valuation of stock price and raising capital. Dion (2000, pp. 36 - 37) suggests that the internal causes for measuring intangible assets include the following:

- to balance against well-established financial measures,
- to monitor the ability to innovate,
- to align resources with and execute strategy,
- to improve knowledge worker productivity and
- to improve operational excellence.

This thesis examines performance measurement as a tool for managing intangible assets. In this study, the concept *intangible success factors*² is used to refer to managerially relevant intangible assets and also to the activities related to improving or utilising these assets. Measuring both types of intangible success factors has been considered important from the point of view of managing intangible assets (Danish Agency for Trade and Industry, 2000; Johanson et al., 2001; Meritum, 2001a). In practice, measuring intangible success factors has been considered difficult (Dion, 2000; Neely et al., 2002; Nordika, 2000), precisely because of their intangible nature (Lönnqvist and Mettänen, 2002).

The relevance of the research issue can be based on three main reasons. First, the success of many organizations depends on the intangible assets in addition to the traditional tangible assets, e.g. financial capital and machinery. Therefore, it is important to be able to manage them. Second, there are currently a lot of problems regarding the measurement of intangible success factors in practice. Thus, examining the measurement of intangible success factors may lead to improved tools for managers for measuring the intangible assets. Third, there is a lack of scientific knowledge regarding the problems related to applying measurement as a tool in managing intangible assets.

1.2 Starting points for the research from academia and practice

1.2.1 Overview of research on the measurement of intangible assets

A significant amount of research has been carried out regarding the management of intangible assets (see e.g. Bukowitz et al., 2003; Danish Agency for Trade and Industry,

² See Chapter 2.3.3 for the definition of the concept and the reasoning behind choosing it.

2000; Nordika, 2000; Meritum, 2001a). During recent years, several frameworks have been developed for measuring intangible assets (Brooking, 1996; Danish Agency for Trade and Industry, 2000; Edvinsson and Malone, 1997; Lev, 2001; Meritum, 2001a; Roos et al., 1997; Sveiby, 1997). In the literature, there are also dozens of possible measures presented (see e.g. Edvinsson and Malone, 1997; Liebowitz and Suen, 2000; Mouritsen et al., 2003a; Rastas and Einola-Pekkinen, 2001). Despite these efforts and the tools developed, applying the measures of intangible success factors in practice has been considered very difficult (Dion, 2000; Neely et al., 2002; Nordika, 2000).

Performance measurement can be divided into three main phases, namely designing and implementing and using performance measures (Franco and Bourne, 2003a, p. 321; Neely et al., 2000, p. 1143). Sometimes updating the measurement system is considered a fourth phase. Designing refers to choosing what to measure and defining the performance measures (Bourne et al., 2000, p. 757). Implementing refers to putting the measures in practice by, e.g., educating employees and developing information systems (Bourne et al., 2000, p. 758; Hannula et al., 2002, p. 151). The use of performance measurement refers to applying measurement information, e.g. for decision-making, control, guidance, education and learning and external communication (Simons, 2000, p. 67). Performance measurement research has focused most on designing, almost as much on implementing and least on using performance measurement (Franco and Bourne, 2003b; Neely et al. 2000).

Based on earlier research on performance measurement, there are several models available for designing and implementing performance measurement systems (e.g. by the Institute of Management Accountants, 1998; Kaplan and Norton, 1996; Leinonen, 2001; Macbryde and Mendibil, 2003; Neely et al., 2000; Olve et al., 1999; Tenhunen et al., 2001; Toivanen, 2001). Also the general challenges related to designing, implementing and using performance measures are quite well known. However, there is a lack of specific knowledge regarding designing, implementing and using performance measures of intangible success factors and the specific problems related to those phases. Thus, both the practical difficulties and the lack of research suggest that more information about the measurement of intangible success factors is needed.

1.2.2 Practical difficulties in measuring intangible assets

This chapter provides some empirical background and personal motivation for choosing this research topic by summarizing the results of two earlier studies on the subject by the author. First, a postal survey was carried out in Finland during the year 2001 (Lönnqvist, 2002). Altogether, the questionnaire was sent to the general managers of 1347 Finnish companies and 13.9 percent of these (i.e. 186 persons) participated in the survey. Second, a single case study was carried out. During the case study, a performance measurement system was constructed for a Finnish industrial company. Both of the studies have been previously reported (Hannula et al., 2002; Lönnqvist, 2002; Lönnqvist and Mettänen, 2002). Therefore, only the main points are presented in the present context.

The survey questions that are examined here concerned the use of performance measurement in managing employees' competencies and knowledge capital. Obviously, intangible assets include a lot more than just competencies and knowledge capital. However, employees' competencies and knowledge capital are certainly some of the key components of an organization's intangible assets.

According to the results of the survey, 58.2 percent of the respondents consider it important or very important to use performance measurement to manage employees' competencies and knowledge capital. Only 15.9 percent considered it meaningless or not very important. In spite of this, only 13.4 percent of the respondents stated that performance measurement is used much or very much to manage employees' competencies and knowledge capital. As many as 56.4 percent of the respondents stated that performance measurement is used only a little or not at all in managing employees' competencies and knowledge capital. The difference between how important managers consider the purpose of using performance measurement and how much they apply measurement for that purpose was measured by comparing the mean values of all answers. The biggest difference in all the 19 purposes of use that were asked about concerned using measures for managing employees' competencies and knowledge capital.

The results of the survey described above are parallel with the results of another study conducted in Finland (Nordika, 2000). In that study, the results showed that 94 percent of Finnish companies consider intangible assets important or very important. However, only 35

percent of the companies have much or very much information on how intellectual capital should be measured and reported. Similar results were obtained in a survey of 431 firms in the United States and Europe carried out by Ernst & Young Center for Business Innovation (Dion, 2000, p. 36). According to the results, 43 percent of the respondents consider the measurement of the value and performance of knowledge assets as highly important. However, only four percent of the respondents consider themselves good or excellent at doing it.

The survey by Lönnqvist (2002) also included a question regarding the problems that might affect negatively the use of performance measurement for particular purposes. According to the results of the survey, clearly the biggest problem that hampers the use of performance measurement is the difficulty of finding or designing measures of some specific factors, e.g. competencies. This result is also quite understandable considering the results of the earlier studies. It is also supported by a survey conducted by PriceWaterhouseCoopers (Neely et al., 2002, p. 18). The results of that survey indicated that managers experienced difficulties in establishing measures of the following factors:

- Intellectual capital (67 percent report difficulty)
- Value from research and development (59 percent report difficulty)
- Customer lifetime value (59 percent report difficulty)
- Brand effectiveness (56 percent report difficulty)
- Innovation (52 percent report difficulty)

In spite of the difficulties related to measuring intangible assets, the results of the survey by Lönnqvist (2002) showed that the ratio of measures of intangible success factors versus all other measures in companies' performance measurement systems has increased during the last five years (52.7 percent of respondents agreed partly or fully regarding the proposition). The results also showed that the use of measures of intangible success factors seems to have increased more during the past five years in companies that use the Balanced Scorecard. In addition, performance measurement is used more to manage employees' competencies and knowledge capital in companies that use the Balanced Scorecard than in the ones that do not. There may be several reasons for this result. First, the Balanced Scorecard is the most commonly used measurement framework in Finland. Where a company has put an effort into developing its measurement system, constructing a Balanced Scorecard has often been a natural choice. Second, the Balanced Scorecard is a 'balanced' measurement model which

incorporates the perspective for learning-and-growth-related success factors. Therefore, it is natural that a Balanced Scorecard should include measures of intangible success factors.

In addition to the survey, early experiences from the measurement of intangible success factors were obtained from a balanced performance measurement system construction process³ (Hannula et al., 2002, p. 139 - 141). During the year 2001, a performance measurement system was constructed for a Finnish industrial company. The measurement system was constructed based on the Balanced Scorecard framework. In this context, the focus is on the learning and growth perspective. It is here considered that the learning and growth perspective represents well, at least partly, the intangible assets of an organization (cf. Kaplan and Norton, 1996). Again, many elements of intangible assets are excluded in this examination. However, the point of this case description is to present the difficulties related to constructing measures of typical intangible-assets-related success factors.

The designing of the measurement system was carried out quite typically as described, e.g., by Kaplan and Norton (1996) and Toivanen (2001). The success factors of the learning and growth perspectives were first chosen based on the management team's discussion of the company's strategic objectives. The first version of the success factors included 1) knowledge about the company's own operations, 2) education, 3) computer-related competencies, 4) industry foresight, 5) continuous improvement and 6) a positive leadership attitude.

Later during the design process, the management team considered again the importance and the measurability of the previously chosen success factors. As a result, the list of success factors was reduced to four factors: 1) responsibility, 2) computer-related competencies, 3) knowledge about the company's own operations and 4) knowing the customer's processes. After the critical success factors had been identified, the management team started to seek concrete measures. At this stage, two main problems were identified. First, the success factors were quite ambiguous. It was difficult to define the success factors exactly, and even more difficult to measure them. Second, the company's information system provided hardly any data needed for calculating the learning and growth perspective measures. Redesigning the information system or gathering the data manually would have occasioned extra costs.

³ The author acted as a facilitator of the process.

Therefore, it was necessary that no irrelevant measures should be included in the measurement system.

After careful consideration, the final list of measures in the learning and growth perspective included only one measure of the four chosen success factors. The success factor 'computer-related competencies' was measured by the amount of computer-use training and education per employee. In addition, the management team decided to include several measures that they could easily get the necessary data for. These included such measures as accident-related absence, sickness-related absence and personnel turnover. The end result hardly describes the original strategically important success factors. It should be noticed that these are just the experiences of one performance measurement system design process which was not even very successful at least from the point of view of measuring intangible success factors. Therefore, the results cannot be generalized to other organizations. However, the case study illustrates some of the problems that may be related to measuring intangible success factors.

The results of the two studies described above show that managers consider it important to use performance measurement to manage intangible assets. In addition, the critical intangible success factors of an organization seem quite easy to identify. However, it is fairly difficult to find concrete measures for these intangible success factors. The problem of finding concrete measures seems to be caused by at least two things. First, the intangible success factors are too ambiguous to measure. Second, information systems do not support the measurement of intangible success factors.

1.3 Research problem and objectives of the study

This research deals with a problem based in practice: it is difficult to design measures of intangible success factors. In the literature, there are many frameworks available for designing measures of intangible success factors (see e.g. Brooking, 1996; Danish Agency for Trade and Industry, 2000; Edvinsson and Malone, 1997; Lev, 2001; Meritum, 2001b; Sveiby, 1997). However, these frameworks mainly focus on identifying a suitable set of measures of intangible success factors for an organization, i.e. they focus on the level of a measurement system. There is a lack of knowledge regarding how the measures of

individual intangible success factors could be designed successfully and which issues cause problems in designing them. In addition, because of the problems experienced in designing the measures of intangible success factors, there is a lack of knowledge regarding implementation and use of the measures.

As mentioned above, this research examines the measurement of intangible success factors from the point of view of three phases⁴ related to measurement (see e.g. Bourne, 2003; Neely et al., 2002):

1. Design phase, which consists of deciding what to measure and defining the measures.
2. Implementation phase, which consists of putting the measures designed into practice by, e.g., developing information systems.
3. Using phase, which consists of, e.g., reviewing measurement results and carrying out actions based on the results.

The following research questions are directly linked to these different phases.

The primary research questions of this research are the following:

RQ1: How can intangible success factors be measured?

RQ2: What are the main challenges in measuring them?

Secondary research questions provide the understanding of the research phenomenon needed to answer the primary questions. The secondary research questions are the following:

Q1: How are the measures of intangible success factors designed?

Q2: What are the main challenges in the design phase?

Q3: How are the measures of intangible success factors implemented?

Q4: What are the main challenges in the implementation phase?

Q5: How are the measures of intangible success factors used?

Q6: What are the main challenges in the using phase?

There are two main research fields in which the measurement of intangible assets has been studied. One is the performance measurement research field which is most closely related to the management accounting research field (Hannula et al., 2002; Kaplan and Norton, 1996;

⁴ See Chapter 4.2 for a more in-depth discussion of the phases of measurement.

Kaydos, 1999; Laitinen, 1998; Neely et al., 2002; Olve et al., 1999; Vaivio, 2001). The other is the intellectual capital and intangible assets research field, which is related to knowledge management and intellectual capital management (Bontis, 2001; Brooking, 1996; Bukowitz et al., 2003; Danish Agency for Trade and Industry, 2000; Edvinsson and Malone, 1997; Lev, 2001; Meritum, 2001b; Mouritsen et al., 2001; Roos et al., 1997; Stewart, 2001; Sveiby, 1997). The research on intangible assets measurement has been carried out at least partially separately in these two research communities and therefore the measurement solutions developed and the concepts used are somewhat different. Because the research field of the measurement of intangible success factors is dispersed, there is a need to integrate the doctrine of the measurement of intangible success factors at two levels: 1) level of concepts and 2) level of measurement methods. This is also an objective of this research.

1.4 Scope of the study

1.4.1 Managerial purpose of measurement

The first limitation of the research is related to the purpose of measurement. Measurement of intangible assets has two main purposes: 1) external, i.e. reporting the value of intangible assets to, e.g., creditors, investors and the community, and 2) internal, i.e. managing an organization's important assets (see e.g. Marr et al., 2002, p. 281 and Sveiby, 1997, p. 163). Sometimes both of these purposes can be addressed at the same time. However, in many cases the need for the two activities may vary (Sveiby, 1997, p. 164). For example, a manager of a small business unit does not necessarily need information regarding the monetary value of the whole company's intangible assets, whereas a company shareholder may consider that crucial information. Thus, some of the managerial measurement methods are not useful in external reporting and vice versa.

In this study the viewpoint is managerial, i.e. internal. Therefore, some of the measurement methods and measurement requirements related to external reporting will not be addressed. The specific limitations regarding measurement methods are presented in Chapter 3.2.2. The following chapter presents another limitation of this study – the focus on small organizations. It seems likely that the internal purposes of measuring intangible assets are,

e.g., more important for a business unit than the external ones. Thus, these two limitations support each other.

1.4.2 Viewpoint of a small organization

The second limitation of this study deals with the nature of the organization in which measurement is carried out. In this study, the focus is on small organizations and organizational units. A small organization refers here to organizations and organizational units that consist of roughly 20 - 50 employees. It would seem evident that large and small organizations have different needs regarding management and the related measurements and, therefore, the practical solutions may also be different. A practical reason for making this choice is that many of the case studies carried out by the Performance Measurement Team at Tampere University of Technology have focused on such organizations. These organizations have clearly stated the need for measuring intangible assets. Another reason is the fact that the point of view of small organizations has been neglected in the research on intangible assets measurement. Johanson and Skoog (2001) have analysed the relevance of measuring intangible success factors in small and medium-sized companies. They state that the measurement is most relevant in mobilizing action, i.e. guiding employees. This supports the rationality of choosing to focus this study both on small organizations and on managerial measures.

Many of the existing measurement models of intangible assets, and performance measurement in general, have been designed from the point of view of a large company (see e.g. Edvinsson and Malone, 1997; Kaplan and Norton, 1996; Marr et al., 2002, p. 283). However, there are some exceptions. Laitinen (1996) has developed a performance measurement model for small organizations (see Chapter 3.1.2). Rantanen et al. (2001) have studied the dimensions of performance measurement in small and medium-sized companies (SMEs). Tenhunen et al. (2001) have developed a model for implementing a performance measurement system in SMEs. Hudson et al. (2001) have examined the performance measurement systems in SMEs. In addition, Wickert and Herschel (2001) and McAdam and Reid (2001) have studied knowledge management in small organizations. From the practical point of view, the Ministry of Economic Affairs in the Netherlands is developing an Internet-based tool for SMEs to assess their intangible assets (de Ruijter 2002). The tool

consists of eighty questions of which a large part deal with the company's intangible assets. The results can be used for benchmarking against other firms and one's own past performance. Despite these examples, the research on the measurement of intangible assets in small organizations has been limited.

The lack of research has resulted in the situation that many of the performance measures of intangible assets presented in the literature seem naïve and useless for managers of small organizations. For example, the number of female managers or the percentage of employees with an academic degree are not very useful measures in an organization with twenty employees. Both of these factors and the changes in them can probably be identified without a performance measure. This results in a question: Which factors related to intangible assets are worth measuring in a small organization? A major difference between large and small organizations is the resources that can be used for designing, implementing and using the performance measures. Small organizations may not have the time or other resources needed for implementing performance measures (Tenhunen et al., 2001, p. 353). Similar findings have been made also regarding the implementation of Activity Based Costing (Malmi, 1997). On the other hand, many issues can be observed in small organizations without managerial tools, e.g. measures, because they are less complex than in large organizations.

The literature suggests that there is a need for both performance measurement and knowledge management activities in small organizations (McAdam and Reid, 2001, p. 240; Tenhunen et al., 2001, p. 353; Wickert and Herschel, 2001, p. 329). Some intangible assets may be even more important to small organizations than to larger ones. For example, the leaving of a key employee with critical competencies can be a big loss for a small organization (Wickert and Herschel, 2001, p. 329). According to McAdam and Reid (2001, p. 240), small and medium-sized companies are less advanced in certain knowledge management activities than larger companies.

1.4.3 Focus on the process of measuring

The third limitation of the study is a more practical one. The issue of measuring success factors related to intangible assets is a very wide one. There are several relevant and valid

research questions that could be addressed. For example, what kind of factors can be considered as intangible assets that could be measured? How can a certain asset, e.g. the competence of employees, be measured? How should a specific measure be applied and how valid and reliable is it?

In this study, the issue is examined at the level of the process of designing, implementing and using performance measures related to intangible assets. In other words, the focus is on the different phases of the organizational process in which factors to be measured are first chosen and then performance measures are designed, implemented and finally used. Focusing on the process level rules out in-depth examination of, e.g., measurement of a specific intangible asset. However, it allows extensive examination of issues related to the different phases of measuring intangible success factors.

A key feature in the research area are the different measurement frameworks, e.g. the Balanced Scorecard and the Intangible Assets Monitor, presented in the literature. In this research the measurement frameworks are not studied as such. The frameworks consist of many things, e.g., the structure and components of the framework and the practical composition of the measurement system, i.e., how many and what kind of measures are used. However, in this study, the main interest is on the phases of measuring individual intangible success factors. The individual measures can be used as parts of a measurement system. The measurement frameworks include guidelines for designing and implementing measures, and the frameworks are examined regarding those perspectives.

The reason for making this third limitation is threefold. First, focusing only on the process level of measurement saves resources. Second, the biggest problems are related to designing individual measures of intangible success factors – not to the composition of the measurement system. Finally, the individual success factors are often the same, regardless of the measurement framework used (cf. Danish Agency for Trade and Industry, 2000; Edvinsson and Malone, 1997; Kaplan and Norton, 1996; Lev, 2001; Meritum, 2001a; Sveiby, 1997). Thus, solving the problems related to designing individual measures of intangible success factors may be utilized in any framework in which measurement of intangible success factors is relevant.

1.5 Research approach

The various possibilities for doing research include, e.g., theoretical or empirical, qualitative or quantitative, exploratory or explanatory, applied or basic, descriptive or normative, etc. (Gummesson, 2000, pp. 1 - 6; Emory, 1985; Olkkonen, 1994; Uusitalo, 1995). The concept of paradigm refers to the commonly accepted view of how to do good research in a certain research field and in a certain time. According to Gummesson (2000, p. 18), “a paradigm consists of the researcher’s perception of what one should be doing and how one should be doing it”. The predominant paradigm has clear implications for practice: “nothing counts as scientific knowledge unless it is accepted as such by its relevant audience, i.e. research community of the research field in question” (Lukka and Kasanen, 1995, p. 74). Instead of one paradigm, it seems that currently there are many accepted ways for doing high-quality research in the field of business economics and industrial management. This chapter describes the methodological approach applied in this research. The aim is to describe how this research is carried out, explain why precisely this approach has been chosen and consider the implications of the decision.

In each research situation there are three interlinked issues that must be considered. These are research problems, methods and materials (or data) (see e.g. Uusitalo, 1995). Basically, the research problem is the starting point which determines the other two. After identifying the research problem, it is possible to decide what kind of research material will be examined and to choose a research method that makes it possible to examine the problem. However, many practical issues, e.g. resource constraints, affect the definition of the research problems, methods and materials. For example, the nature of the available research material may limit the research questions that are examined. In this research the definition of the research problem and objectives was mainly dependent on the judgment of the researcher. The practical limitations were greater with regard to choosing the research material and methods. These issues will be discussed in detail later in this chapter where each method is considered.

Gummesson (2000, pp. 57 - 81) highlights the importance of the researcher’s preunderstanding of the research issue, i.e. of the researcher’s insights and experiences before starting a research project. Adequate preunderstanding is required in order to, e.g., be able to identify a suitable research method that will provide new insights into the research

issue. In this case, the author's previous knowledge of the topic was based on the work for his Master of Science thesis (Lönnqvist, 2000) and his Licentiate of Technology thesis (Lönnqvist, 2002) both of which concerned performance measurement. In addition, the author had earlier participated in two balanced performance measurement system design projects and had been working on a research project that examined performance measurement in knowledge intensive organizations. The author's Licentiate and Master's degrees are from the field of industrial engineering and management. Issues related to intangible assets, e.g. competencies and organizational culture, have not been traditionally considered part of that field. Thus, the author's ability to address those issues could be considered limited. However, the topic is examined in this research from the point of view of managing intangible assets. Therefore, the issue can be considered well suited to the author's background.

This research can be characterized as a *qualitative multiple case research*. Qualitative research relies on interpreting verbal or visual research material (Uusitalo, 1995, p. 79). In comparison, quantitative research consists of argumentation that is based on numbers and statistical associations between numbers (Alasuutari, 1999, p. 34). As the names suggest, qualitative research is based on qualitative research material, e.g. interviews, and on qualitative analysis methods, e.g. interpretation, while quantitative research is based on quantitative research material, e.g. questionnaire data, and on quantitative analysis methods, e.g. various statistical tools. The underlying research paradigm differs between these two approaches. Qualitative research is usually related to hermeneutics and quantitative research is related to positivism (Gummesson, 2000, p. 178; Olkkonen, 1994, p. 35). Positivism is typical in natural sciences and it includes characteristics such as reliance only on verified facts and the aim of describing only concrete real-life phenomena (Gummesson, 2000, p. 19; Olkkonen, 1994, p. 26). Hermeneutics refers to research that aims at generating in-depth understanding of a phenomenon that may be new or otherwise hard to structure formally (Olkkonen, 1994, p. 37). Although qualitative and quantitative research are often considered opposites, they also have many similarities and they can be considered different parts of a continuum (Alasuutari, 1999, p. 32).

According to Eisenhardt (1989, p. 534), case study is a research approach that focuses on understanding the dynamics present within single settings. Case studies are carried out in order to examine in-depth and holistically certain phenomena in selected cases. Case study

is sometimes considered only a research method. However, it should be considered a research approach in which various qualitative and quantitative research methods, e.g. analysing archives, conducting interviews or using questionnaires, can be applied (Gummesson, 2000, p. 3; Eisenhardt, 1989, p. 534; Meredith, 1998, p. 442).

Case study was chosen as the research approach to be used in this study for several reasons. First, it was suited for examining the research problem at hand, which can be characterized as complex and extensive, i.e. the research issue consists of many factors that are interconnected. The case approach makes it possible to examine a problem thoroughly in a specific organization and thus gain an understanding of the phenomenon. It was considered that an in-depth understanding of the issue must be obtained in order to learn something new about the issue. Second, case study approach is very versatile. It was possible to apply different research methods within the case study in order to reach different sub-objectives of the research. Third, the researcher's work offered resources and an opportunity to conduct case research.

Choosing the cases is an important phase of case research. In quantitative research, a sample is chosen randomly from the population that is studied. The sample must be large enough in order to be able to make a statistical generalization of the results (see e.g. Lukka and Kasanen, 1995, p. 78). However, case research does not rely on random sampling used in statistical research. Instead, theoretical or purposive sampling is used (Curtis et al., 2000, p. 1002; Eisenhardt, 1989, p. 537; Yin, 1994, p. 51). This means that the choice of cases is based on some theoretical reason. For example, it is rational to choose such cases that seem to present new aspects of the research phenomenon. Sometimes extreme or polar situations, e.g. successful and unsuccessful cases, are chosen (Eisenhardt, 1989, p. 537). The number of cases is one practical aspect in choosing cases. Single and multiple case studies can both be used. Multiple case research allows cross-case analysis. Furthermore, case studies can consist of multiple levels of analysis (*ibid.*, p. 534).

This research involves three cases, i.e. three organizations in which the measurement of intangible success factors is examined (see Chapter 6.3 for a description of the organizations). The decision to choose these three organizations was based both on theoretical and practical criteria. First, the focus of the research, measurement of intangible success factors, sets certain criteria for the cases. It was considered that knowledge-

intensive organizations would be a fertile group for examination because intangible success factors are very important in their operations. Second, the research examines problems in three different phases of measurement: design, implementation and use. Thus, the case organization had to be willing to commit itself to a relatively long period and use resources in developing the measurement system. Finally, certain organizations participated in a research project that was carried out by the Performance Measurement Team at Tampere University of Technology. Three of them fulfilled the two previous criteria and thus they were chosen.

The design of this research is described in Figures 1 and 2. This research consists of several methods that will be used to answer the research questions. The first part is literature research. Doctrine is a concept that refers to the accumulated knowledge in each research field that has been gained from earlier research (Olkkonen, 1994, p. 42). The doctrine relevant for this research was determined using a literature review and analysis. The second part, which is parallel and overlapping with the literature analysis, is conceptual analysis. It was carried out in order to cope with the currently confusing use of concepts in the literature. The method of conceptual analysis is described in Chapter 2.2. Case studies in three organizations form the empirical part of this research. In the case studies, three different methods are used to provide different empirical viewpoints on the research issue. The practical execution of the case studies as well as the individual research methods are described in more detail in Chapter 6.

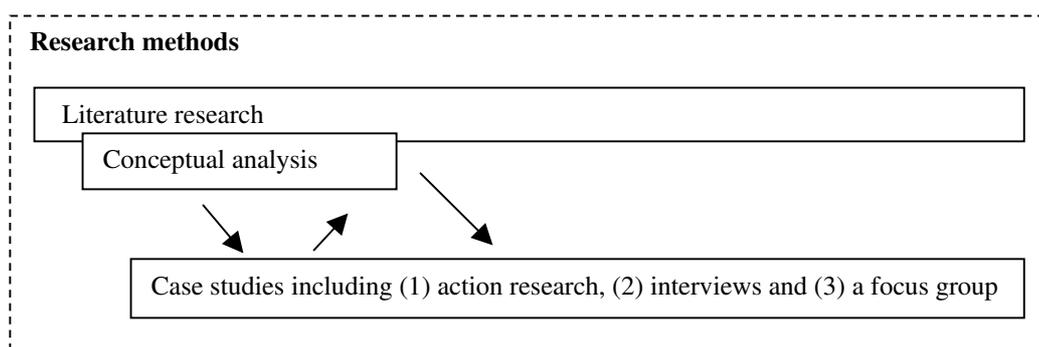


Figure 1. The research design used in this thesis.

The arrows in Figure 1 represent the interaction between theory and the empirical examination. The theoretical and empirical parts of the research were carried out partially simultaneously. Theory was constantly mirrored against the empirical experiences while

conducting the empirical case examinations. This is typical of hermeneutic research (see e.g. Gummesson, 2000, p. 70).

The empirical part of this research includes three different methods: action research, interviews and a focus group. There were two main reasons for choosing these methods. First, different problems may occur in practice in different phases of performance measurement. Therefore, these different phases must somehow be examined. Second, in this research setting no single method was well suited for examining each of the three phases of measurement. While one method fits a certain phase well, it provides no access to research data in another phase.

Action research was carried out in the design phase of measurement. The researcher had access to the design process as facilitator. Another key benefit was that action research offers in-depth information on the process (cf. Coughlan and Coughlan, 2002; Gummesson, 2000, p. 209; Kaplan, 1998). Interviewing was used in the implementation and use phases. The researcher did not participate in those phases and interviewing offered an access to data. A focus group was used to provide additional information regarding the use of performance measurement. This was considered an innovative and infrequently used approach that might produce interesting results.

Figure 2 shows how the empirical and theoretical examinations contribute to the research issue. Each type of examination provides a different viewpoint on the issue. The methods are presented in parallel with the time of examination and the phases of measurement. It also represents simplistically the progress of this research. In the beginning, there was the knowledge obtained from previous literature. This was the starting point for designing the measures. Action research was carried out during the design phase. Since the researcher could not participate in the implementation phase, experiences of the employees were collected by interviewing them during and after the implementation. After the implementation, interviewing was also used to examine how the new measures are used. Finally, a focus group was organized at the end of the project in order to gain more information on the use and usefulness of the measures.

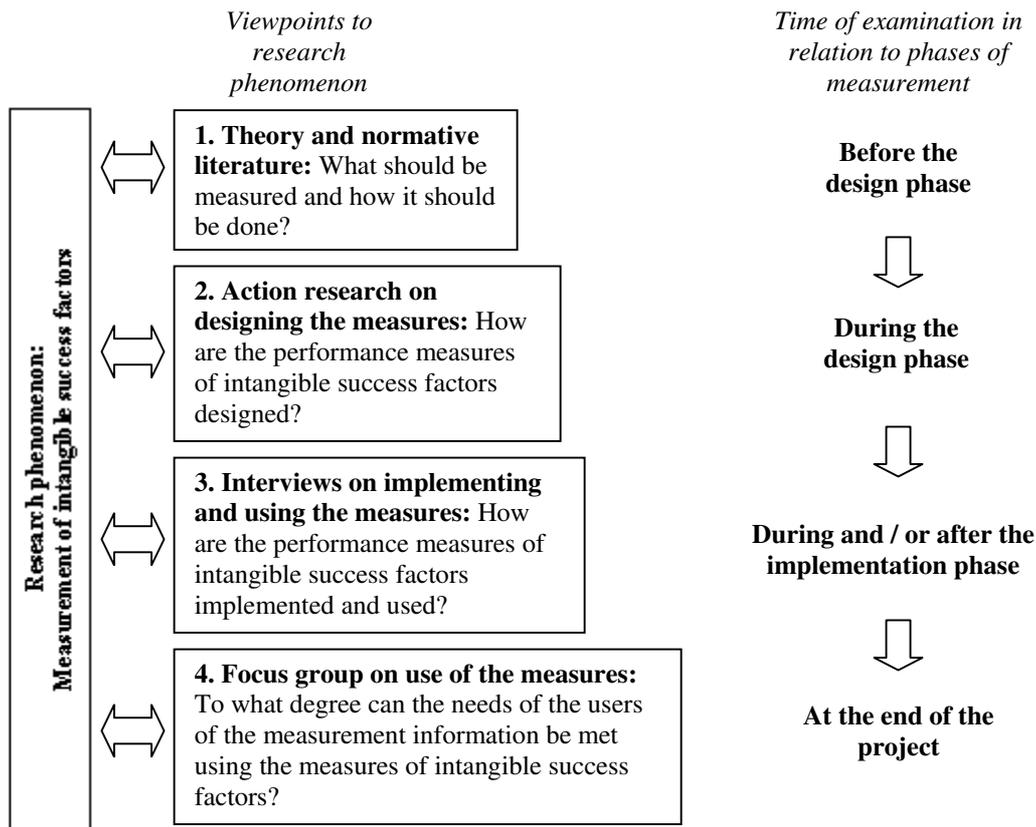


Figure 2. Different viewpoints on the research issue.

Research should fulfil certain criteria in order to be considered sound. Such criteria include at least validity, reliability, relevance and generalizability. These criteria will be used later (in Chapter 9.3) to assess this research. In this chapter, they are considered from the point of view that they are affected by the choice of the research approach and methods. The first criterion deals with validity: the results produced by research should be verified. According to the hermeneutic view, the validity of evidence is based on presenting the results and the way in which they have been reached in such a manner that the correctness of the results can be ascertained (Olkkonen, 1994, p. 54). A successful case study should convince the reader of the validity of the case description and analysis (Lukka and Kasanen, 1995, p. 75).

Triangulation is a means for increasing the reliability of research. Triangulation can be carried out in terms of data sources, methods, investigators and theories (see e.g. Yin, 1994, p. 92). The idea is that using e.g. two or more methods to examine the same phenomenon increases reliability by eliminating possible bias in one method (Green et al., 2002, p. 135; Gummesson, 2000, p. 142). In this research, triangulation is carried out using multiple data

sources, methods and investigators. According to Eisenhardt (1989, p. 538), one way to involve multiple investigators is to make visits to case organizations in teams. This approach is also used in this research. Although the viewpoints used in the different empirical methods are different, they provide information on the same issue from several data sources, i.e. from the three different case organizations. In summary, several researchers have participated in the research, several research methods have been used and several sets of research data examined.

Another quality criterion of research is the generalization of the results. Generalization in case studies differs from that of statistical studies (Gummesson, 2000, p. 89). Using the rhetoric of contextual generalization provides a way to move from isolated results to a more general status (Lukka and Kasanen, 1995, p. 75). It is based on understanding the historical and institutional context of the case situation. According to Lukka and Kasanen (1995, p. 84), the preconditions of generalizability are theoretical knowledge of the subject area, prior empirical results and their interpretations as well as empirical relations and their interpretations provided by the study in question. In this research work, the prior empirical and theoretical knowledge is presented and assessed in the first five chapters. The results of the case studies are later assessed in relation to the prior research.

Case study as a research method has both positive and negative aspects. According to Meredith (1998, p. 444), the positive aspects of case studies include relevance, understanding and exploratory depth, while the negative aspects include access and time, triangulation requirements and unfamiliarity of procedures (see Table 1). The relevance of case research derives from examining phenomena in their natural surroundings. The in-depth and holistic examination of one or a few cases provides understanding and makes it possible to explore issues that are not well understood. These positive aspects are accompanied by more negative characteristics. It may be difficult to gain access to cases, the in-depth examination takes a lot of time and triangulation requires even more work. Nowadays, case research is a quite commonly used approach in the field of industrial management and performance measurement in particular (Marr and Schiuma, 2002, p. 355). In addition, more methodological literature has been written since Meredith's research (see e.g. Coughlan and Coughlan, 2002; Curtis et al., 2000; Gummesson, 2000). Thus, the unfamiliarity of case study procedures was not considered problematic in this research.

Table 1. Advantages and disadvantages of case research. (Amended from Meredith, 1998, p. 443.)

Advantages of case research	Disadvantages of case research
<ul style="list-style-type: none"> - Relevance - Understanding - Exploratory depth 	<ul style="list-style-type: none"> - Access and time - Triangulation requirements - Unfamiliarity of procedures

As has been described above, case study is a versatile approach for conducting research. However, it also includes some challenges for the researcher. In the words of Lukka and Kasanen (1995, p. 76): "It should be noted that the case method is an extremely demanding research method. The claimed relevance, thoroughness and bindingness of the results to former knowledge require strong supporting arguments." This means that even though carrying out case research in practice may sometimes seem quite easy, it is difficult to present the evidence in a manner that is credible and solid.

Another way to classify the present research work for this thesis is to define it as applied and empirical research. The aim of this research is to examine the practical problems that organizations experience in measuring intangible success factors. In the field of industrial management applied research is quite common (Olkkonen, 1994, p. 18), i.e. research focuses on practical problems experienced by organizations. Thus, examining the issue in practice, i.e. conducting empirical research, was a logical choice.

The classification of research approaches by Neilimo and Näsi (1980) and Kasanen et al. (1991) has been quite widely accepted in the context of Finnish research on business economics and industrial management (see e.g. Hannula, 1999, p. 7; Koskinen, 2001, p. 4; Kulmala, 2003, p. 23; Olkkonen, 1994; Toivanen, 2001, p. 13). The classification includes five types of research approaches: conceptual analysis, nomothetical, action-oriented, decision-oriented and constructive (Kasanen et al., 1991, p. 317). The research for this thesis can best be related to action-oriented research, which has the following characteristics: strong interrelationship between researcher and the research object, empirical examination in the form of only a few cases and holistic research problems related to, e.g., organization activities, problem solving and development processes (cf. Olkkonen, 1994, pp. 72 - 75). The classification by Neilimo and Näsi is not widely used in international research. Instead, other characterizations, e.g. those mentioned earlier in this

chapter, are used. In addition, it seems that the purpose of the classification has been sometimes misunderstood. It has been considered in some cases as an exact guide for doing research, when it actually only presents how different approaches for doing research relate to each other.

1.6 Structure of the research

Figure 3 presents the structure of this thesis. The numbered titles inside the boxes are the titles of all the first-level chapters. This first chapter has introduced the reader to the research topic and presented the research questions and methods. The remainder of the thesis consists of three main components – the theoretical framework, the empirical examination and the conclusions arrived at in the research.

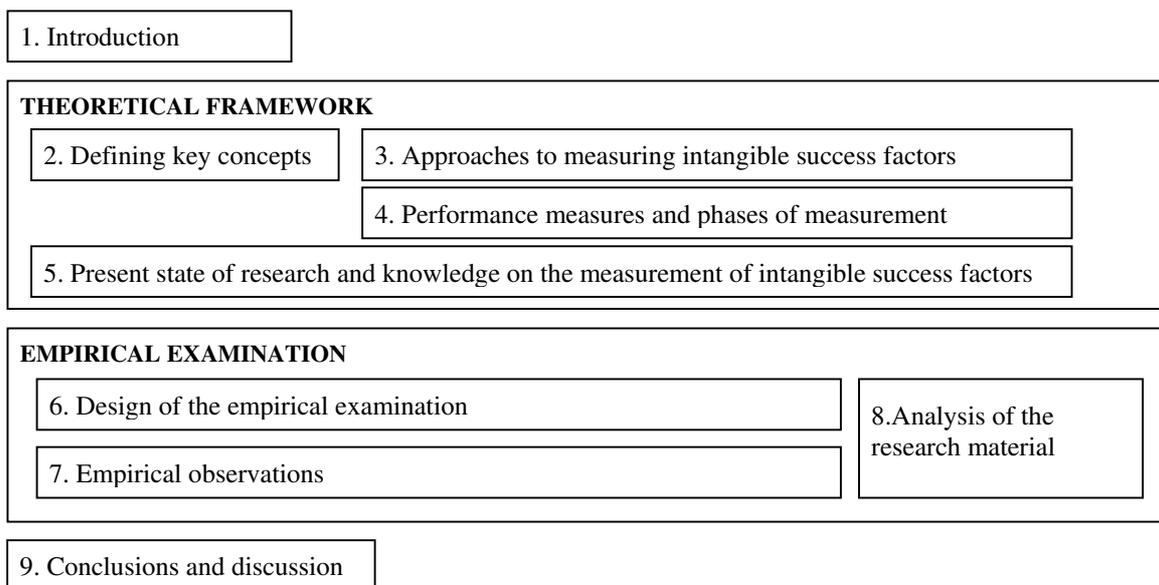


Figure 3. The structure of the thesis.

The theoretical framework consists of Chapters 2, 3, 4 and 5. It deals with the concepts and methods of measuring intangible success factors. The empirical examination consists of describing and analysing case studies that were carried out in three organizations. This is done in Chapters 6, 7 and 8. Finally, Chapter 9 presents the conclusions of the research.

2 DEFINING KEY CONCEPTS

Defining concepts is an important part of any research. In this chapter, the reasoning for the specific need for a careful conceptual analysis regarding this research issue is first presented. It is followed by a discussion of the method of conceptual analysis. After that, the actual analysis of concepts, i.e. regarding the definitions, meanings and terms used, is carried out. Finally, the key concepts are summarized.

2.1 Diverse use of concepts – the motivation for conceptual analysis

As mentioned in Chapter 1.3, there are two main research fields where the measurement of intangible assets has been studied: the performance measurement research field and the intangible assets research field. Since research on intangible assets measurement has been carried out at least partially separately in these two research areas, the measurement solutions developed and the concepts used are somewhat different. These different approaches are briefly described below.

A common way to carry out performance measurement is to use some kind of balanced performance measurement framework (e.g. the Balanced Scorecard) (see e.g. Adams and Roberts, 1993; Kaplan and Norton, 1996; Laitinen, 1998b; Lynch and Cross, 1991; Maisel, 1992; Neely et al., 2002; Tuomela, 2000). The inclusion of non-financial measures for the measurement system in addition to the traditional financial ones creates the balance in the balanced measurement systems. The non-financial measures include production- and service-related measures, e.g. quality, time and efficiency measures. In addition to these operational factors, also more intangible factors, e.g. employee and customer satisfaction can be measured. The balanced performance measurement frameworks are aimed at providing a comprehensive picture of an organization's performance. The measures are based on an organisation's business objectives and the main aim of a performance measurement system is to assist an organization in achieving those objectives. A performance measurement system is mainly an organization's internal management tool. (See e.g. Kaplan and Norton, 1996; Neely et al., 2002.)

The starting point of several studies related to the measurement of intangible assets has been the need to provide an organization's managers and external stakeholders (e.g. shareholders and creditors) with additional information regarding the traditional financial statement (see e.g. Edvinsson and Malone, 1997; Lev, 2001). Especially for knowledge-intensive organizations, the financial statement shows only a small part of the total assets of an organization (see e.g. Edvinsson and Malone, 1997, pp. 1 - 10; Lev, 2001, p. 8). It has been stated that for many organizations the intangible assets, e.g. organizational structure and employees' competencies, may be even more important than their tangible assets (Hope and Hope, 1998). Therefore, they should be managed and also reported to external stakeholders.

Many studies have aimed at constructing an intellectual capital statement or report (see e.g. Brooking, 1996; Edvinsson and Malone, 1997; Roos et al., 1997). These frameworks usually focus on measuring only intangible factors. In this way it is possible to focus on the challenging task of measuring intangible factors. On the other hand, it may not be clear how the intangible assets are supposed to relate to the financial and other tangible factors. Many of the intangible asset measurement systems may be used both internally and externally.

In the literature, there are four common concepts that are used to refer to the intangible factors related to organizations' business operations. The concepts are intellectual capital, intangible assets, intangibles and non-financial success factors. The concepts are overlapping and sometimes used as synonyms. However, there are also several differences. The concepts have different origins and they are designed for different purposes. Table 2 illustrates the different approaches and the different concepts used. The first approach examines the factors of an organization's performance (the performance measurement research field). The second approach in the table examines the value of an organization's assets or capital (the intangible assets research field). It should be noted that this classification is only a rough generalization and does not describe fairly the work of all researchers. For example, many researchers in the field of intangible asset research study intangible assets from the point of view of improving organizational performance (cf. Lev, 2001; Marr and Schiuma, 2001; Sveiby, 1997).

Table 2. Different perspectives on and concepts related to organization.

Point of view	Main components
1. Performance of organization	Financial and non-financial success factors
2. Value of organization	Financial and intellectual capital Tangible and intangible assets Tangibles and intangibles

The objective of this part of the thesis is to analyse and integrate the different concepts related to the measurement of intangible assets in order to obtain more accurate definitions. From the point of view of this thesis, a practical objective of the conceptual analysis is to choose a suitable concept that can later be used to refer to the immaterial phenomena that are measured when discussing the different measurement frameworks using different concepts.

The definition of concepts is very important in this research field for two reasons. First, the use of concepts related to intangible assets is somewhat ambiguous. Second, precise definition is required before a phenomenon can be measured. Since this research deals with the measurement of intangible assets, this point is emphasized. Olkkonen (1994, p. 103) describes the logical chain of reasoning related to operationalizing a phenomenon as follows:

Describing the phenomenon → Conceptualising and defining the phenomenon
→ Determining how the phenomenon can be quantified → Measuring

Key concepts are analysed and defined in the following chapters. The questions examined are: What is the meaning of each concept, what is it used to describe and what is its historical background? In addition, it is determined how the concepts relate to each other. The method of conceptual analysis is described in the following chapter.

2.2 Concepts and the method of conceptual analysis

According to Olkkonen (1994, p. 100), a concept is an abstract, general and compact definition of a phenomenon. Näsi (1980, p. 10) has offered a more precise definition by stating that concepts are the counterparts of thinking level which are presented on a

linguistic level by terms or other symbols related to an imaginary or an objective world; concepts describe compositions of mental images and meanings for contents. Precisely defined concepts are essential for scientific research. Especially when the measurement of a phenomenon is carried out, concepts and their definitions are key factors of successful research. (Olkkonen, 1994, p. 97)

Various concepts are used in the everyday practice of management. These concepts can be called colloquial. For a particular phenomenon, there can be both colloquial and scientific definitions of a concept. In scientific language, the criteria of the definitions of concepts regarding their form and presentation are stricter than in colloquial language. This is caused by the scientists' need to express phenomena as exactly as possible for other researchers. (Näsi, 1980, pp. 5 - 7) In the previous paragraph, two definitions of 'concept' were presented. Olkkonen's definition can be considered colloquial since it is somewhat imprecise and general, whereas Näsi's definition can be considered more scientific since it is exact and its scope is carefully defined.

The colloquial and scientific definitions of concepts are used for different purposes (Olkkonen, 1994, p. 97). Scientific definitions of concepts may be too complicated for colloquial use. However, sometimes the gap between colloquial and scientific language is diminished. For example, in action science, colloquial and scientific language must coexist because there is a close interaction between the researcher (who uses scientific language) and the informants (who use colloquial language) (Näsi, 1980, pp. 34 - 35). Thus, the scientific definitions of concepts used in action science are more colloquial than in more positivistic studies.

Näsi (1980, p. 17) has stated that "contemporary science would not be possible without conceptual analysis". The analysis of concepts is an important part of any research project. In fact, all research approaches consist of a conceptual analytic part. On the other hand, conceptual analysis can be used as an independent research approach. (Näsi, 1980, p. 33) According to Olkkonen (1994, p. 65), the purpose of carrying out conceptual analytic research is to develop systems of concepts. They are needed, e.g., in describing, understanding and classifying phenomena. The challenge is to develop concepts that will be easy for others to understand (Emory, 1985, p. 24).

Both Näsi (1980) and Olkkonen (1994) have presented process models for carrying out conceptual analytic research. Näsi focuses his attention to the way the concepts are analysed, whereas Olkkonen pays attention to the entire research process. The models can be considered as complementary to each other. Both of the models are used here to explain the analysis and definition of concepts in this research.

Conceptual analysis starts with defining the problem and the purpose of using the concepts (Näsi, 1980, p. 14; Olkkonen, 1994, p. 67). The problem in this study is that the use of concepts related to the measurement of intangible assets is quite ambiguous and diverse. The concepts used to describe the problem vary between and within research fields of performance measurement and intangible assets. The purpose of this conceptual analysis is to generate a consistent set of concepts that can be used by researchers of the two research fields. The concepts are intended to be used in action research projects and thus they should be practical, i.e. colloquial enough, so as to be usable also among managers.

The concepts are analysed and developed by performing both internal and external analysis of the concepts. Internal analysis refers to examining the contents of the concepts and considering the various views that have been presented regarding them (Näsi, 1980, p. 13). External analysis refers to separating the concepts from similar concepts and identifying the upper-level concepts (Näsi, 1980, p. 13). In this study, the focus is mainly on the internal analysis. This is due to the vast volume of varying views regarding the components related to the measurement of intangible assets. However, external analysis is also necessary in order to separate closely related concepts, e.g. intangible assets and intangible success factors. One aspect of conceptual analysis is the examination of the origins, i.e. the history, of a concept. In this research, the historical aspect of conceptual analysis is not included. An in-depth historical analysis of all relevant concepts could have provided valuable information on the issue. However, it was not possible to carry this out because of the lack of the researcher's resources. In addition, the historical origins of the concepts is not necessary information due to the practical aims of the analysis mentioned earlier.

As a conclusion of the analysis, the definitions of the concepts are presented. As in any research, the results (here the definitions of concepts) should somehow be verified (Olkkonen, 1994, p. 67). Verifying the results is difficult in the case of a study in which concepts are developed for a particular purpose. A practical measure of the successfulness

of the new concept definitions is the extent to which other researchers accept and adopt them. Unfortunately, from the point of view of verifying the results of a certain study, this occurs only after the publication of the research. In practice, the “verification” refers to careful argumentation and reasoning (see Näsi, 1980, p. 14). In Emory’s (1985, p. 24) words, the success of a research work depends on the clarity of the conceptualisation and on how well others understand the concepts used.

In the following chapters, the conceptual analysis is carried out by first discussing the concepts related to performance measurement. Then, the concepts related to intangible assets are analysed. Finally, these two views are combined to present, define and justify the key concept of this study, ‘intangible success factor’.

2.3 Definitions of key concepts

2.3.1 Performance measurement

An organization’s performance is a complex phenomenon. Ultimately, the performance of an organization is about achieving its goals (Hannula and Lönnqvist, 2002; Institute of Industrial Engineers, 1990, pp. 11 - 14). However, performance can be examined from different perspectives and therefore the goals may differ between perspectives. In the Balanced Scorecard measurement system, an organization’s performance is usually examined from four perspectives: financial, customer, process and growth (Kaplan and Norton, 1996). The Performance Prism framework contains five perspectives on performance: stakeholder satisfaction, strategies, processes, capabilities and stakeholder contribution (Neely et al., 2002). Other researchers have proposed different perspectives. When an organization’s performance is examined from different perspectives with various objectives, also different types of performance measures are needed.

Performance can also be examined at different organizational levels. According to Laitinen (1998b, p. 14), performance can be defined as the measurement object’s (e.g. company, team or employee) ability to generate output which has predetermined characteristics relative to predetermined goals. According to another definition by Laitinen (1998b, pp. 18 - 19), performance is the organization’s ability to maximize the owner’s benefits while also

sufficiently satisfying the needs of other interest groups. Other interest groups include employees, customers, authorities and so on.

As a term, performance can be understood in several ways. First, performance refers to the actual results or outputs of certain activities. For example, a company's performance can be assessed based on its financial results. Second, performance refers to how an activity is carried out, i.e. how something is being performed. Third, performance may also refer to the ability to achieve results. In conclusion, performance may relate to actual results, activities or the potential for results. Traditionally, the actualised results have been the main focus of attention (see. e.g. Asikainen and Nissinen, 1990; Humble, 1976; Santalainen et al., 1987; Stockton, 1987). The main reason for this is that actual results are often considered more important than the uncertain potential for achieving results. However, a balanced view of performance focuses attention also on the operational factors (e.g. efficiency and quality in production process) and factors affecting future results (e.g. R&D activities or developing employees' competencies). This suggests that the three interpretations of the term performance correspond to the different practical views of performance.

As described above, performance is a phenomenon that is not easy to define exactly. Performance may be different depending on the perspectives it is examined from. Therefore, a practical and versatile definition of performance is the measurement object's ability to achieve results in relation to goals. This definition does not take a stand regarding which perspectives performance is examined from, what the goals are or what the measurement object is. This definition of performance is measurement-oriented, but in the context of measuring performance that seems acceptable.

Now that performance is defined, the terms measurement and performance measurement should be defined. According to Ijiri (1967, p. 22), the assignment of numbers to objects is called measurement. Vehmanen (1982, p. 75) provides a more exact definition of measurement: "measurement is an effective assignment of numbers to a relevant quantity on the basis of empirical operations". 'Effective assignment of numbers' means that the numbers representing certain properties must have the same relationship to each other as do the properties that are represented. The word 'relevant' refers to the purposive nature of the measurement process. It means that there should be a reason for measurement. 'Quantity' refers to the fact that qualitative properties also have to be quantified. 'Empirical operations'

have to be the basis for the effective assignment of numbers to a relevant quantity. 'Empirical operations' refer to the act of measurement itself. Vehmanen (1982, p. 77) also emphasizes that there should first be a theory about the measurement before the empirical operations of measurement can be carried out.

According to Emory (1985, pp. 85 - 92), the phenomena that are measured are objects or their properties (or attributes). Objects include both material and immaterial things, e.g. books, cars or attitudes. Properties are characteristics of the objects, e.g. the colour, price or size of a car. An important aspect of measurement is the measurement scale used. Typically, there are four different types of scales: nominal, ordinal, interval and ratio scale. A nominal scale separates the observations into different categories, e.g. people can be divided into male or female categories based on gender. An ordinal scale is more informative than nominal scale because it places the categories in an order. An ordinal scale can show whether someone is bigger or happier than someone else without stating by how much. Questionnaire questions often use ordinal scales (e.g. A. strongly agree, B. agree, C. no opinion, E. disagree, F. strongly disagree). An interval scale again is more informative than an ordinal scale because the intervals on the scale have equal distances. An example of an interval scale is the Celsius temperature scale. Finally, a ratio scale includes all the informative properties of the other three types of scales. In addition, ratio scales include an absolute zero or origin. Weights and monetary values are examples of properties that are measured using ratio scales.

The applicability of the term 'measurement' is open to criticism when it is used in association with intangible issues. Intangible phenomena may not be easily quantifiable. In practice, intangible factors are often measured using, e.g., questionnaires that describe subjective interpretations of representatives of relevant stakeholders (see e.g. Rastas and Einola-Pekkinen, 2001; The Measures Catalogue, 2003). In these cases, the terms 'evaluation' or 'assessment' might be more suitable. However, the term 'measurement' can be understood simply as a way for providing managers with reliable and meaningful information (Kaydos, 1999, p. 19). Thus, the term can cover both the quantitative and assessment-based aspects of the activity. Further, the intangible phenomena can likely be measured using at least nominal or ordinal scales. Those are common forms of measurement, as described earlier. In conclusion, the definition of measurement used in this research is the same as that suggested by Vehmanen (1982).

The general theoretical definition of measurement presented earlier is in agreement with the more practical definitions presented regarding performance measurement. According to the Institute of Industrial Engineers (1990, pp. 11 - 14), performance measurement is a process aiming to assess achievements in relation to historical results or other target values or criteria. Neely et al. (1996, p. 11) define performance measurement as the process of quantifying the efficiency or effectiveness of purposeful action. Hannula and Lönnqvist (2002, p. 47) define performance measurement as a process used to determine the status of an attribute relevant to the performance of the measurement object. All three definitions describe performance measurement as a process in which activities are carried out in order to determine the status of some activity or result. These definitions do not say anything about the process itself. When performance measurement is considered as a management tool, the process of carrying it out is important and should be explained more precisely.

The basic process of performance measurement consists of four main phases (Neely et al. 2000, p. 1143). The first phase is to decide what to measure and then to choose or design suitable measures. Measurement can be carried out using individual performance measures or a performance measurement system which consists of several individual measures. In the second phase, (the measures or) the measurement system is implemented in the organisation. This includes e.g. determining how the data is collected, how the measurement results are reported and how the measures are used. After the measurement system has been designed and implemented, the third phase is simply to use the measures. The final phase, the updating of the measurement system, closes the loop. Every time an organisation's business objectives change, the measurement system must be redesigned accordingly (see e.g. Gueldenberg, 1999, pp. 13 - 14). Otherwise the measures will no longer provide relevant information.

The literature suggests that, as a managerial tool, performance measurement can be used to translate an organisation's strategy into concrete objectives, communicate the objectives to employees, guide and focus employees' efforts towards achieving these objectives, control whether or not the strategic objectives are reached, use double-loop learning to challenge the validity of the strategy itself, and visualize how individual employees' efforts contribute to the overall business objectives (see e.g. Neely, 1998a; Lönnqvist, 2002; Simons, 2000; Uusi-Rauva 1996a). When performance measurement is considered as a managerial tool and

a process, the following definition (amended from Okkonen et al., 2002) may be used: Performance measurement is a process in which measures are first constructed based on managerially relevant success factors. Then the measures are used to help implement strategies and achieve objectives and, finally, the measurement results are analysed to provide feedback for formulating new business objectives.

Performance measurement is a tool that can be used for many purposes, as described earlier. It can be an integral part of the management process. On the other hand, performance measurement can be used to determine how the results of some individual factors develop as time goes by without any linkage to some specific managerial processes. Therefore, it is defined here so that the definition suits all the different purposes of measurement; performance measurement is a process used to determine the status of an attribute or attributes of the measurement object. The definition is almost the same as the definition by Hannula and Lönnqvist (2002, p. 47). Two small changes have been made to it. First, it is possible to measure one or more attributes of the measurement objects. Thus, ‘attributes’ has been added. Second, ‘relevant to the performance’ was excluded because it does not provide additional information to the definition and it can be considered a circular definition.

Performance measures are indicators used to quantify the efficiency and / or effectiveness of purposeful action (Neely et al., 1996, p. 11). In other words, a performance measure is the means for determining the status of a measurement object. An organization’s performance is often examined through success factors which can be chosen from different perspectives. In performance measurement, the objects that are measured are often called success factors⁵ (see e.g. Kaplan and Norton, 1996). The measurement object, i.e. the success factor, and the performance measure are separate things. One success factor can be measured using various measures. Measures describe some dimensions of the factor or something else that indicates the measured factor (Emory, 1985, p. 85). The validity of a measure is a characteristic that describes how well the measure describes the success factor (see e.g. Emory, 1985; Hannula, 1999). In addition to validity, there are several other criteria for sound performance measures, e.g. reliability and practicality.

⁵ See Chapter 2.3.3 for a more in-depth definition of the concept ‘success factor’.

Sometimes the terms indicator or metric are used as synonyms for measure. However, in their latest book, Neely et al. (2002, p. xiii) use the following definitions: Performance *measure* is a parameter used to quantify the efficiency and / or effectiveness of past action and performance *metric* is the definition of the scope, content and component parts of a broadly-based performance measure. According to the authors, customer satisfaction is an example of a performance measure. Customer satisfaction can be divided into component parts, e.g. on-time delivery and value for money, which are called metrics.

The above definitions of the concepts measure and metric are contrary to what is commonly used in the field of performance measurement and of measurement in general. First, the measurement object is usually called a success factor. For example, Neely et al. (2002, p. xiii) name 'customer satisfaction' as a measure. However, customer satisfaction is commonly considered a success factor (see e.g. Neilimo and Uusi-Rauva, 1997, p. 287). Second, some kind of instrument or procedure is used to carry out measurement and is commonly called a measure. Measures rarely describe the success factor comprehensively. They focus rather on only a certain dimension of the factor. It would seem that Neely et al. use the term metric to refer to these dimensions and to the way they are measured. However, the term performance measure is typically used for that purpose. Thus, there does not seem to be any need for another concept, metric. As a general term, metric can be used as a synonym for measure. Also the term indicator serves the same purpose. Therefore, they can be used as synonyms in the context of performance measurement. In this study, the term performance measure is used.

In the literature, there are hundreds of different performance measures available (see e.g. The Measures Catalogue, 2003). Measures are usually chosen specifically according to the needs of a particular organization and situation. Sometimes there are not any suitable measures available. In these situations, available measures can be modified or entirely new measures can be designed. There are also several different types of performance measures available (see e.g. Kaydos, 1999, p. 19). The list below presents some classifications used in the literature. The classifications are self-explanatory since they are primarily aimed at describing different measures. Different types of performance measures include:

- Direct vs. indirect measures
- Leading vs. lagging measures

- Monetary vs. non-monetary measures
- Qualitative vs. quantitative measures
- Result vs. cause measures
- Subjective vs. objective measures

In this research, performance measure is defined as the means for determining the status of an attribute or attributes of a measurement object. This is coherent with the previously presented definition of ‘performance measurement’.

Performance measurement systems consist of several measures. According to (Neely et al., 1996, p. 11), a performance measurement system is the set of indicators used to quantify the efficiency or effectiveness of purposeful actions. Quite similarly, Hannula and Lönnqvist (2002, p. 43) define a performance measurement system as a collection of measures which are essential from the viewpoint of the measurement object’s performance. The latter definition is somewhat optimistic since, in practice, measurement systems may include unnecessary measures and lack measures that would provide important information.

Performance measurement systems can be constructed based on a measurement framework or model, such as the Balanced Scorecard. The measurement frameworks consist of the principles for designing measurement systems, i.e. choosing measures. In addition to using a model in constructing a measurement system, it is also possible to design the system without any specific model. Further, performance measurement systems can be used at several organizational levels, e.g. company, business unit, team and individual levels. Since there is a large variety of performance measurement systems, it is difficult to provide an accurate definition. Here the following definition is used: A performance measurement system is a set of measures which are used to determine the status of attributes of the measurement objects.

2.3.2 *Intangible assets*

There is a wide variety of definitions for the concepts intellectual capital, intangible assets and intangibles. Sometimes they are treated as synonyms and sometimes not. In this chapter, the definitions of different researchers are first presented. Different definitions are then compared to each other and the analysis is supported with terminological considerations.

The starting point of several researchers' definitions for intangible assets or intellectual capital is the need to better explain the composition of the total value or the market value of a company. In the latter part of the 1990's, the situation for many companies was that their book value represented only a small part of the company's market value. The difference between market value and book value was considered to be the result of the company's intellectual capital or intangible assets. (See e.g. Sveiby, 1997, pp. 3 - 7; Lev, 2001, p. 9; Edvinsson and Malone, 1997.) Nowadays, it is quite commonly accepted that the interpreting difference between market value and book value is problematic and that it cannot be used as a measure of the value of intangible assets (cf. Lev, 2001, p. 9).

Figure 4 presents an example of an organization's total assets. An organization's tangible assets include fixed assets, such as property and equipment, and current assets, such as inventories, cash and current receivables. The right-hand side of Figure 4 shows Sveiby's interpretation of intangible assets. According to him, an organization's external structure, internal structure and the competence of its personnel are the components of intangible assets. Employee competence includes the skills and know-how the employee possesses. It results in the capacity to act in a wide variety of situations to create results. The internal structure consists of, e.g., patents, concepts, models, administrative systems and organizational culture. The external structure consists of, e.g., brands, trademarks, image and the relationships with customers and suppliers. (Sveiby, 1997, pp. 10 - 11)

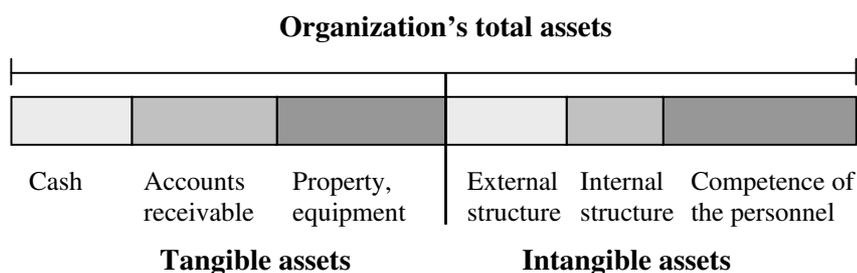


Figure 4. An example of an organization's total assets. (Amended from Sveiby, 1997, p. 11.)

In financial accounting, the term intangible assets is used to refer to certain items on the balance sheet. These include, e.g., research and development expenses, immaterial property rights and goodwill (see e.g. Ihantola and Leppänen, 1998, p. 196). Acceptable items vary according to different country, depending on the accounting standards used (Radebaugh and

Gray, 1997, pp. 273 - 287). The definition of intangible assets used in financial accounting is narrower than, e.g., Sveiby's definition above. Thus, it can be stated that organizations have many kinds of intangible assets; some of them can be included on the balance sheet and some of them cannot.

According to a definition by OECD (Petty and Guthrie, 2000, p. 158), intellectual capital is the economic value of two categories of intangible assets of a company: organizational ("structural") capital and human capital. Structural capital refers to, e.g., software systems, distribution networks and supply chains. Human capital refers to human resources within the organization (employees' resources) and external to the organization (customers and suppliers). In addition to these two categories, there are also other forms of intangible assets, e.g. a company's reputation. Thus, intellectual capital is a subset of intangible assets according to this definition.

Also Edvinsson and Malone (1997, p. 52) divide intellectual capital into human capital and structural capital (see Figure 5). Human capital consists of, e.g., the knowledge, skills and innovativeness of employees (Edvinsson and Malone, 1997, p. 34). Structural capital consists of customer capital and organizational capital. Customer capital refers, e.g., to the strength and loyalty of the customer relationship. Organizational capital includes innovation and process capital. Process capital consists of the organization's processes and the techniques used, e.g. to increase efficiency. Innovation capital includes intellectual properties, such as trademarks. In addition, it includes the "surviving residue of intangible assets, such as the theory by which the business is run" (Edvinsson and Malone, 1997, p. 36). Thus, Edvinsson and Malone consider intellectual capital and intangible assets as consisting of the same things. On the other hand, Edvinsson and Malone (1997, p. 43) consider intellectual capital to be a debt issue, not an asset issue. This means that for them the role of intellectual capital is like that of equity and liabilities, not that of inventories or equipment. Intellectual capital is borrowed from stakeholders. In accounting, a counterbalance for intellectual capital would be goodwill.

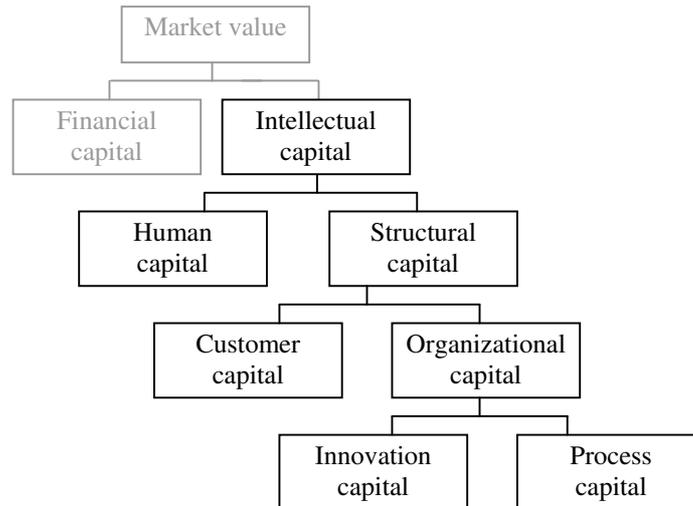


Figure 5. Components of intellectual capital. (Edvinsson and Malone, 1997, p. 52)

According to Mayo (2001, pp. 32 - 37), tangible assets are the same as financial and physical capital and intangible assets are the same as intellectual capital. His book (Mayo 2001) focuses on the human capital of organizations. Human capital consists of social, emotional, relationship and knowledge capital. Ahonen (2000, p. 45) states that human capital can be examined from three perspectives: as the number of employees, as employees' personal properties and as work community (organization).

Brooking (1996, p. 12) states that intellectual capital is the term given to the combined intangible assets which enable the company to function. According to her, the components of intellectual capital are market assets, intellectual property assets, human-centred assets and infrastructure assets. According to Roos et al. (1997, p. 57), intellectual capital includes human capital and structural capital. This division is the same as, e.g., that of Edvinsson and Malone. The difference is that Roos et al. divide human capital into competence, attitude and intellectual agility, and structural capital into relationships, organization and renewal and development.

Ståhle and Grönroos (2000, pp. 192 - 199) divide intellectual capital into potential and realised intellectual capital (see Figure 6). Intellectual capital is only potential until it is transformed into economic value added. This results in realised intellectual capital which can be a productive customer base, a growing market share, consolidation of the brand and the number and productivity of new innovations. It is worth noting that for Ståhle and Grönroos intangible assets, e.g. immaterial property rights and business applications, are

only a subset of potential intellectual capital. It would seem that they consider intangible assets as the assets that can be put on the balance sheet.

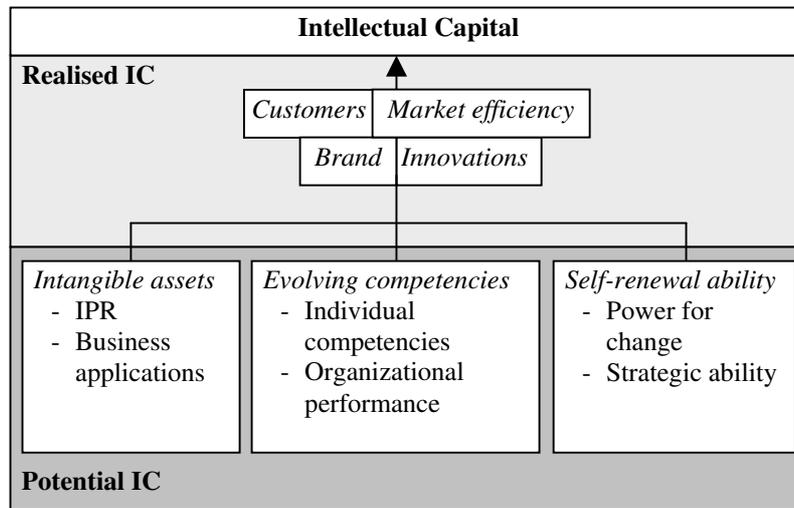


Figure 6. Realised and potential intellectual capital. (Ståhle and Grönroos, 2000, pp. 195 - 197)

Also according to Ahonen (2000), intangible assets can be divided into two different types: generative and commercially exploitable intangibles. According to Hussi and Ahonen (2002, p. 277), generative assets include human capital, internal structure and external structure. Commercially exploitable assets include cost-efficiency and immaterial property rights. The generative assets can also be called intellectual capital (Bontis, 2001).

According to Lev (2001, p. 7), “intangible assets are non-physical sources of value (claims to future benefits) generated by innovation (discovery), unique organizational designs, or human resource practices”. Lev (2001, p. 18) classifies intangibles into three categories: innovation-related intangibles, human resource intangibles and organizational intangibles. He uses the terms intangibles, knowledge assets and intellectual capital interchangeably. Lev (2001, pp. 21 - 22) considers intangibles as assets similar to physical, human and financial assets with few exceptions. For example, tangible assets can be used for only one purpose at a time. In contrast, intangibles, e.g. knowledge, can be used for multiple purposes simultaneously.

Marr and Schiuma (2001) use the concept knowledge assets to describe intellectual capital. The components of knowledge assets, according to Marr and Schiuma, are presented in the following figure. Their definition of knowledge assets seems different from that of others

presented earlier. However, they have actually only grouped the items differently than, e.g., Edvinsson and Malone. Marr and Schiuma suggest that their model would be well suited especially for managerial purposes.

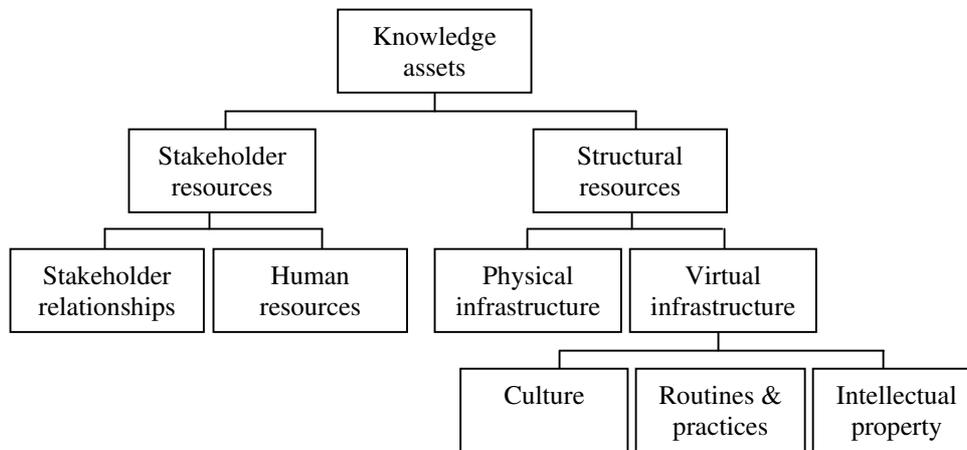


Figure 7. Organization’s knowledge assets. (Marr and Schiuma, 2001, p. C4B/15)

Mettänen (2002, p. 18) has analysed different definitions of intellectual capital and intangible assets and found three general categories to which components of intellectual capital can be assigned. These are employee-related capital, external stakeholder-related capital and internal structure-related capital (see Table 3). Mettänen has not considered which concept would be most suitable for intangible assets. She has focused on the components regardless of the terms used. Mettänen’s collection of factors related to an organization’s intellectual capital is very useful for this research. It breaks down the organization’s intellectual capital into different intangible factors. Because of the scope chosen in this research, the individual intangible factors are of special interest.

Table 3. Factors related to organization’s intellectual capital. (Mettänen, 2002, p. 18)

Employee-related capital	External stakeholder-related capital	Internal structure-related capital
<ul style="list-style-type: none"> - Knowledge and competencies - Experience - Education - Creativity, innovativeness - Other properties (e.g. leadership, entrepreneurship) 	<ul style="list-style-type: none"> - Relationships with customers and other stakeholders - Contracts and arrangements with stakeholders - Organization’s image and brands 	<ul style="list-style-type: none"> - Technologies - Information systems - Data bases - Processes - Culture and values - Management philosophy - Patents, copyrights, trade secrets, and other immaterial properties

There are several different definitions of intangible assets and intellectual capital as the definitions presented show. Different authors interpret and use the terms quite differently. First, some authors consider intangible assets and intellectual capital as synonyms (Brooking, 1996; Lev, 2001; Marr and Schiuma, 2001; May, 2001). Second, some consider intellectual capital a subset of intangible assets (Bontis, 2001; Hussi and Ahonen, 2002) or vice versa (Ståhle and Grönroos, 2000). Third, many authors divide intangible assets (or intellectual capital) into components. For example, Edvinsson and Malone (1997) divide intellectual capital into human, structural, customer, organizational, innovation and process capital. Fourth, some authors consider that there are different types of intangible assets (or intellectual capital), e.g. generative and commercially exploitable intangibles (Ahonen, 2000) and potential and realized intellectual capital (Ståhle and Grönroos, 2000). These examples of different interpretations illustrate that the terminology has not yet become established.

Two of the most commonly used terms are intellectual⁶ capital⁷ and intangible⁸ assets⁹. The terms asset and capital both refer to something valuable that is owned by an organization. They can be used as synonyms (Merriam-Webster Unabridged On-line Dictionary and Thesaurus, 2003). The terms intellectual and intangible are more different when compared to each other. Intangible refers to something immaterial. Intellectual, however, can be considered something related to the use of, e.g., employees' intellect or reasoning. For example, the experience of employees is often considered an important asset. Experience is clearly something intangible but not necessarily intellectual. The same applies, e.g., to brands or culture. Therefore, the term intangible can be seen as a wider term than

⁶ **Intellectual** refers to “of or relating to the intellect or its use; developed or chiefly guided by the intellect rather than by emotion or experience; requiring use of the intellect; given to study, reflection, and speculation; engaged in activity requiring the creative use of the intellect”.

⁷ **Capital** refers to “relating to or being assets that add to the long-term net worth of a corporation; a stock of accumulated goods especially at a specified time and in contrast to income received during a specified period; the value of these accumulated goods; accumulated goods devoted to the production of other goods; accumulated possessions calculated to bring in income; net worth”.

⁸ **Intangible** refers to “something intangible; specifically: an asset (as goodwill) that is not corporeal”.

⁹ **Asset** refers to an “entire property of a person, association, corporation, or estate applicable or subject to the payment of debts; an item of value owned”.

intellectual. In addition, tangible¹⁰ is clearly the antonym for intangible. It is difficult to precisely define the antonym for intellectual. The literature suggests the confrontation with intellectual and financial (capital). However, this does not seem logical from a terminological point of view. Intangibles as a noun is a general term which can be used to describe any immaterial phenomenon. If the purpose is to refer to assets specifically, the term intangible assets seems more exact than just intangibles.

Based on the above considerations, the term intangible assets is preferred in this study. The following definition is used in this research: intangible assets consist of the non-physical sources of value related to employees' capabilities, organizations' resources and way of operating and the relationships with its stakeholders. The term intellectual capital can be used as a synonym if it is considered more descriptive in a certain situation. The definition is based on Lev's (2001, p. 7) definition which is supplemented with the three main types of intangible assets: employees' capabilities, organizations' resources and way of operating and the relationships with its stakeholders. These three types of intangible assets are quite commonly used in the literature (see e.g. Bukowitz et al., 2003; Mettänen, 2002; Sveiby, 1997). In addition, describing in the definition what the types of intangible assets are was considered more informative than describing how they may have been generated, which was the case in Lev's original definition.

Intangible assets differ from tangible assets in certain respects. First, the obvious difference is that tangible assets are material, e.g. money, machines and facilities, while intangible assets are immaterial, e.g. competencies and management philosophy. Second, the ownership of tangible assets is usually clear and, in the case of intangible assets, it is not (Brooking, 1996, p. 15; Edvinsson and Malone, 1997, p. 11). Machines and facilities can be owned and controlled by an organization. However, an organization cannot own its employees' competencies or the organizational culture. For example, an organization loses an employee's competencies if he or she decides to leave the organization. On the other hand, some of the intangible assets can clearly be owned by an organization. These include,

¹⁰ **Tangible** refers to "capable of being perceived especially by the sense of touch; substantially real; capable of being precisely identified or realized by the mind; capable of being appraised at an actual or approximate value".

(Merriam-Webster Unabridged On-line Dictionary and Thesaurus, 2003)

e.g., databases and immaterial properties such as patents and trademarks. Third, tangible assets can usually be purchased and sold, but intangible assets not necessarily (Edvinsson and Malone, 1997, p. 11). With the exception of the ones that can clearly be owned, it is difficult or impossible to purchase many of the intangible assets. For example, an organization's culture or working atmosphere cannot easily be copied or moved to another organization. This is due to the way in which the intangible assets have been generated, i.e. by innovation, unique organizational designs or human resource practices (Lev, 2001, p. 18). For this reason, they also cannot be copied by a competitor, which may serve as a source of competitive advantage.

The fourth difference is that tangible assets can usually be used only for one purpose at a time, while intangible assets can be used simultaneously for several purposes (Lev, 2001, p. 22). When a certain amount of money has been invested for some purpose or when a facility is used for some activity, it cannot be used for something else at the same time. Intangible assets do not necessarily have the same limitations. For example, an employee can share his or her knowledge and competencies with colleagues, which makes it possible to apply them simultaneously in multiple situations. It may be possible to identify other differences in addition to those mentioned. Nevertheless, the differences between tangible and intangible assets are likely to have an effect on how they are managed. This research examines the issue from the point of view of measurement. It should be noted that it may not always be easy to determine which assets are intangible and which are tangible (*ibid.*, p. 7). Intangible assets may be embedded into, e.g., physical assets (such as computers) and labour (tacit knowledge of employees).

The concept of intangible assets could have been analysed much more thoroughly than has been done in this chapter. Indeed, the varying interpretations of the concept by different authors suggest that more research is required for a full understanding of the issue. However, it is considered here that, within the scope of this research, the concept has been defined with adequate precision.

2.3.3 *Intangible success factors*

An organization's performance can be examined through success factors, which can be chosen from different perspectives, e.g. the perspective of customers, processes or shareholders. Success factors may consist of the outcomes of activities and other factors, i.e. performance drivers, affecting the outcomes (Olve et al., 1998, p. 24). Examples of an organization's success factors include effectiveness, efficiency, quality, productivity, quality of work life, profitability and innovation (Sink, 1983, pp. 36 - 39). According to Hannula and Lönnqvist (2002, p. 56), success factors are key aspects where targets must be reached in order to succeed in business objectives and strategies. 'Success factor' is a general and versatile concept in the sense that almost any business related phenomenon, e.g. an intangible asset, could be considered a success factor.

The factors being measured are often called success factors (Hannula et al., 2002; Kaplan and Norton, 1996; Toivanen, 2001). Usually, the goal is to identify and choose success factors to be measured so that those important issues can be managed. However, an organization may measure several factors which may or may not be success factors. Organizations may not always be able to identify the true success factors or they may be too difficult or expensive to measure. They may also measure many factors that provide interesting information but which are not very important for their success. In many cases, whether something is considered a success factor or not in a certain situation depends on the consideration and understanding of the persons choosing the factors to be measured.

Because of the problems related to the term 'success factor', it would be possible to drop the word 'success' in the term and use solely the term 'factor'. It would also be possible to use the term 'measurement object', which is a descriptive and general term. However, neither of these terms is commonly used in performance measurement literature. Thus, despite the problems associated with the term, 'success factor' is used as the term describing the objects that are measured.

There is a long tradition of measuring financial success factors, e.g. profitability and costs. During recent decades, the measurement of non-financial factors has also become common (see e.g. Kaplan ja Norton, 1996; Toivanen, 2001, pp. 5 - 8; Neely et al., 2000; Vaivio, 2001). Non-financial success factors typically include, e.g., quality, efficiency, time and

volume related to operations, services or products. Many of these factors are tangible and physical, such as amounts and volumes. In addition to these, some non-financial factors, e.g. employee satisfaction and an organization’s image, can be described as intangible and non-physical. On the other hand, some non-financial success factors, e.g. time, can be characterized as intangible, yet physical. Clearly most of the financial success factors are tangible in nature since many of them represent monetary values related to an organization’s results. For example, capital adequacy refers to the amount of debt in relation to equity – an issue which can be clearly calculated from monetary figures. However, some financial factors can also be considered intangible. For example, the value of a brand is a financial phenomenon. However, the brand itself is intangible and immaterial. Figure 8 clarifies the difference between financial and non-financial factors and between tangible and physical and intangible and non-physical factors. The allocation of success factors to the four boxes is based on the author’s judgment. Thus, the classification is not necessarily exactly accurate. However, the main aim is only to present examples of different types of success factors.

Success Factors		
	<i>Financial</i>	<i>Non-financial</i>
<i>Tangible & physical</i>	<ul style="list-style-type: none"> - Economic growth - Liquidity - Product / service costs - Profitability - Capital adequacy 	<ul style="list-style-type: none"> - Delivery time - Quality of products - Production volume - Productivity - Stock turn time - Service volume
<i>Intangible & non-physical</i>	<ul style="list-style-type: none"> - Brand value - Goodwill - Value of immaterial properties 	<ul style="list-style-type: none"> - Competencies - Customer satisfaction - Customer retention - Innovation - Motivation - Personnel satisfaction

Figure 8. Classification and examples of common success factors.

Traditionally, success factors have been classified as financial and non-financial success factors. The purpose of Figure 8 is, first, to illustrate that it is possible to classify success factors also based on how tangible and physical they are. Second, and more importantly, it can be used as a tool in identifying the possibilities for integrating the different concepts used in relation to performance measurement and intangible assets. It seems that the success factors that are located in the two lower boxes are the ones that are often considered the

most difficult to measure (in performance measurement). Many of them could be located at the Learning and Growth perspective of a Balanced Scorecard, which was illustrated as difficult from the point of view of designing measures in practice in Chapter 1.2.2. Further, it seems that the success factors that are located in the two lower boxes could also be called intangible assets (or aspects of intangible assets). Most of the success factors can be found, e.g., in Mettänen's presentation of factors related to intangible assets (Table 3). In comparison, the success factors that are located in the two upper boxes are usually considered quite easy to measure and could be considered to be related to tangible assets. In conclusion, intangible assets seem to consist of, at least partially, the same issues as intangible and non-physical success factors.

From a managerial point of view, the definitions and classifications of intangible assets presented in the previous chapter offer information on which intangible assets could be important. In other words, important components of intangible assets can be identified. It is also possible to consider the intangible assets as success factors that can be improved and also measured (as described in the previous paragraph). In addition to focusing on only the intangible assets, also the actions aimed at improving the assets can be just as interesting and important. Such activities could include, e.g., education, networking activities, organizational development activities and marketing activities. Lönnqvist and Mettänen (2002) have used the term intellectual-capital-related success factors to refer generally to all success factors that are related to intangible assets – regardless of whether they are assets or some activities related to them. The term is descriptive but quite awkward.

According to the Meritum Guidelines (Meritum, 2001a, p. 9), intangible assets can be considered as both a static concept (i.e. as resources) and as a dynamic concept (see Figure 9). The dynamic view of intangible assets refers to intangible activities which consist of three components: developing or acquiring new intangible assets, increasing the value of current intangible assets and assessing and controlling intangible activities. Thus, the measurement of intangible assets should be focused both on intangible assets and intangible activities. The logic of static and dynamic aspects of intangible assets seems sound. However, the chosen terminology seems somewhat problematic. Can an activity be intangible? An activity implies the carrying out of something, i.e. doing something. Perhaps thinking could be considered as an activity that is intangible in nature. However, many of the intangible activities mentioned in Figure 9 are likely quite concrete, e.g. recruiting new

employees or improving relationships with customers by making visits to their organization. A more suitable term might be, e.g., ‘activities related to intangible assets’.

Static concept	Intangible assets		
	Capital	Competencies	
Dynamic concept	Intangible activities		
	Developing or acquiring new intangible assets	Increasing the value of current intangible assets	Assessing and controlling intangible activities

Figure 9. Intangible assets as static and dynamic concepts. (Meritum, 2001a, p. 9)

Johanson et al. (2001) use the term ‘intangible performance drivers’ to refer to activities (or enablers) that enable future performance. They suggest that, from the point of view of understanding organizational processes, it might be more valuable to focus on the activities instead of resources, i.e. assets in the traditional sense. The activities include, e.g., human resource management (supporting employee motivation) and information utilization (access to critical information).

Sveiby (1997, p. 165) suggests that intangible assets should be measured from the point of view of growth and renewal, efficiency and stability. The first and third refer to the changes in the amount and quality of intangible assets. The second refers to the ability to utilize the assets. Also Edvinsson and Malone (1997, p. 183) suggest that some of the measures they propose would measure the efficiency of intangible assets while other measures focus on the quantity or value of intangible assets. The Danish Guidelines (Danish Agency for Trade and Industry, 2000) and the Meritum Guidelines (Meritum, 2001b) suggest that also the activities related to, e.g., improving intangible assets should be measured. Thus, it seems that from a managerial point of view activities related to intangible assets are important in addition to the assets themselves.

If an intangible asset or some activity related to it is considered to be important for an organization and is therefore measured, it could be called a success factor. Many of the intangible assets, e.g. customer satisfaction, employee competencies and image, are referred to as such in any case in the literature on performance measurement (see e.g. Kaplan and Norton, 1996, pp. 67, 75 and 133). Also Roos et al. (1997, p. 63), in their book on

intellectual capital, use the term 'key success factors' to refer to the intangible assets that are measured.

The concept of intangible assets as defined in the previous chapter refers to an organization's non-physical resources. It excludes, e.g., the activities used to improve them. For instance, the organization's way of operating refers, e.g., to its management processes and values – not to improving intangible assets. In this study, the term intangible success factors is used to refer to a) managerially relevant intangible assets and b) activities related to improving or utilising the assets. This concept is suggested to be used especially in the context of performance measurement and when both intangible assets and activities related to them should be covered. The concept is in accordance with the intangible assets and performance measurement related terminology presented in the previous chapters. It integrates the concepts used in these two fields, thus making it possible to use a single term to describe the various non-physical issues discussed within various measurement frameworks.

Above, success factors were divided into two new groups: tangible and physical and intangible and non-physical. On the other hand, the concept 'intangible assets' deals with the non-physical sources of value. Thus, when the definition of the concept 'intangible success factors' is tied to the concept of 'intangible assets', it implies that also the success factors in question include only non-physical assets and related activities. The concept 'intangible success factor' includes both the static and dynamic interpretations of intangible assets described by the Meritum group (Meritum, 2001a). Also, both intangible assets and activities related to them can be described using a single concept. The concept intangible asset excludes activities which are also considered managerially important (Danish Agency for Trade and Industry, 2000; Johanson et al., 2001).

Intangible success factors can be considered a subset or a type of success factors. If success factors were divided into two groups, the other type in addition to intangible success factors would be tangible success factors. Tangible success factors are related to tangible and physical assets and activities. Many of the tangible success factors are related to financial phenomena, e.g. profitability and liquidity, or to operations, e.g. on-time delivery and productivity. They are concrete in nature and can usually be measured quite easily using some physical properties.

It is justified to question whether it makes sense to start using a new concept, i.e. intangible success factors, when there already exist established concepts such as intangible assets, activities related to the assets and non-financial success factors. It can also be questioned whether it is reasonable to create a top-level concept that consists of both assets and activities. There are two main justifications for the decision. First, ‘success factor’ was earlier defined as a versatile concept that could define almost any business-related phenomenon. In fact, success factors can include both assets, e.g. efficient customer service or good image, or activities, e.g. the type and number of marketing activities carried out in order to improve the image. Therefore, there is nothing at all new in describing different types of issues under a single concept. Second, many of the performance measurement frameworks consist of non-financial success factors that, to some degree, are overlapping with intangible assets. This may cause confusion when trying to include intangible assets in a measurement system; it may be difficult to distinguish between the existing non-financial success factors, e.g. customer loyalty or the motivation of employees, and the intangible assets. The concept ‘intangible success factors’ can be used to describe all the intangible and non-physical success factors as well as the intangible assets and the related activities. In addition, it serves in colloquial usage when discussing the various non-physical phenomena that it is important to manage and measure.

The term intangible success factors has been previously used by Lipiäinen (2000, p. 278)¹¹. His definition is somewhat different than that presented above. He divides the success factors in business into two main groups: an organization’s external and internal success factors. External success factors consist of tangible and intangible success factors, while internal success factors consist of organization-centric and human-centric success factors. According to him, intangible success factors consist of skilled employees, competitive environment, logistics and the management of transport. In comparison, tangible success factors consist of, e.g., the location of the business, infrastructure, clean environment and the availability of risk capital. (Lipiäinen, 2000) Despite the differences in the definitions of the concept in Lipiäinen and this study, there are also similarities. Both concepts refer to immaterial aspects of business that are relevant for management.

¹¹ Lipiäinen writes in Finnish. The Finnish term ‘aineettomat menestystekijät’ can be directly translated as ‘intangible success factors’.

2.4 Summary of key concepts

Table 4 summarises the key concepts and their definitions that will be used in the following chapters. The concepts related to measurement are considered to have the following relationships with each other. 1) Performance is the measurement object's ability to achieve results in relation to goals. 2) The measurement objects are called success factors. 3) Intangible success factors are specific types of success factors consisting of intangible assets and the activities related to improving or utilising the assets. 4) Performance measures are designed to measure the success factors. 5) Performance measurement is the process of determining performance in a certain measurement situation. 6) A performance measurement system consists of several performance measures.

Table 4. Summary of key concepts.

Concept	Definition
<i>Intangible assets</i>	consist of the non-physical sources of value related to employees' capabilities, an organization's resources and way of operating and the relationships with its stakeholders. The term intellectual capital can be used as a synonym if it is considered to be more descriptive in a certain situation.
<i>Intangible success factors</i>	are a type of success factors that consist of a) managerially relevant intangible assets and b) the activities related to improving or utilising the assets.
<i>Measurement</i>	is the effective assignment of numbers to a relevant quantity on the basis of empirical operations.
<i>Performance</i>	is the measurement object's ability to achieve results in relation to goals.
<i>Performance measure</i>	is the means for determining the status of an attribute or attributes of a measurement object.
<i>Performance measurement</i>	is a process used to determine the status of an attribute or attributes of the measurement object.
<i>Performance measurement system</i>	is a set of measures which are used to determine the status of attributes of the measurement objects.
<i>Success factors</i>	are key aspects where targets must be reached in order to succeed in business objectives and strategies. In performance measurement, the objects that are measured are called success factors.

According to the definitions above, the basic measurement object is a success factor. Figure 10 presents a classification of and the hierarchy between different success factors. The classification suggests that there are both tangible and intangible success factors. Intangible success factors include intangible assets and activities related to intangible assets. Thus, in

the context of measurement, intangible assets and activities are considered as subsets of success factors.

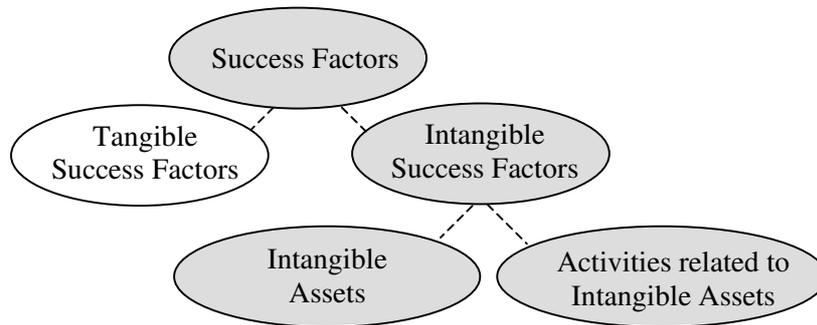


Figure 10. The suggested hierarchy between certain concepts in the context of measurement.

In the following chapter, several measurement approaches are presented that use different concepts or different definitions of the same concepts. The definitions of key concepts presented in the present chapter can be used to assess the different measurement approaches despite the differences in concepts.

3 APPROACHES TO MEASURING INTANGIBLE SUCCESS FACTORS

This chapter begins by presenting management accounting as the background for performance measurement as well as selected frameworks for performance measurement. There follows a presentation of the development of the field of intangible assets management and an introduction to several models for measuring intangible assets. In addition to these two main approaches, human resources costing and accounting as well as quality management frameworks are presented as other methods for measuring intangible success factors. They are examined less thoroughly than the two aforementioned approaches because they are considered not as important from the point of view of the objectives of this research. The presentation of the different approaches is mainly descriptive: the goal is to describe the different frameworks available. This chapter ends with a critical assessment of the role of each approach in measuring intangible success factors. The different approaches are also compared to each other.

3.1 Performance measurement

3.1.1 Management accounting and performance measurement

Management (or managerial) accounting has been practiced since the nineteenth century. Accounting in general goes back to even earlier days. (See. e.g. Johnson and Kaplan, 1987.) As companies, working methods and business environments have changed, the methods of management accounting have also evolved. However, various types of performance measures have always been a central part of accounting.

Management accounting is a discipline that provides tools for the basic managerial processes: planning, implementing the plans, checking progress and acting on the information (see e.g. Andersin et al., 1994, p. 7). Performance measurement is a versatile tool for management that can be applied in numerous ways and for various purposes, depending on the situation. For example, nineteen different purposes for using performance measurement were identified in the author's Licentiate thesis (Lönnqvist, 2002, p. 38). Some of the most commonly known purposes for using performance measurement include

guiding employees, planning for operations, controlling operations, alarming in case of problems, diagnostics, learning, informing and rewarding (Uusi-Rauva, 1996a, p. 11).

In the early days of managerial accounting, performance measurement focused on financial phenomena, e.g. costs and return on investment. Especially since the late 1980's, research as well as the associated practical application of non-financial performance measures became common (see e.g. Laitinen, 1998a; Rahiala 1985; Stivers et al., 1998; Vaivio, 2001; Yritystutkimusneuvottelukunta, 1979). Nowadays, one of the latest trends in performance measurement is the measurement of intangible assets (see e.g. Lev, 2002). That is also the focus of this research.

Performance measurement frameworks, e.g. the Balanced Scorecard and the Performance Prism, include elements of intangible assets. Also in practice these quite widely used balanced performance measurement systems often include some measures of intangible success factors. Therefore, studying these frameworks may provide some insight on how the measurement of intangible success factors has been approached from the point of view of management accounting.

3.1.2 Balanced performance measurement systems

3.1.2.1 General properties of balanced performance measurement frameworks

During the 1990's, balanced performance measurement frameworks became popular in organizations all around the world. The Balanced Scorecard presented by Kaplan and Norton in 1992 can be seen as a major contributor to the phenomenon since it is the most commonly used measurement model in many countries (Lönqvist, 2002, p. 80; PMA, 2001, p. 17; Toivanen, 2001, p. 97). However, also other researchers have presented similar ideas regarding 'balanced' performance measurement even earlier than Kaplan and Norton. For example, the French version of the Balanced Scorecard, the Tableau de Bord, has been used for over half a century (Epstein and Manzoni, 1997, p. 28). Other early advocates of balanced performance measurement systems include, e.g., Lynch and Cross (1991), Maisel (1992) and Uusi-Rauva (1987).

Balanced performance measurement is sometimes referred to as comprehensive or holistic measurement. Different balanced measurement frameworks have certain differences, but the main principles are usually the same:

- Performance measures are chosen based on the organization's vision and strategy.
- Success factors are chosen from several perspectives (e.g. the shareholder's and customer's) in order to provide a balanced and holistic view of the organization and other factors affecting its success.
- Measurement is focused on a limited number of critical success factors.
- The measurement system is designed in a way that there are causal relationships between the success factors.
- The measurement system can be used as a tool in communicating and implementing strategy. (Kaplan and Norton, 1996; Neely et al., 2002; Tuomela, 2000, pp. 97 - 102)

The measurement systems described above are sometimes called strategic performance measurement systems. In those cases, the strategic basis of measurement and the use of measurement for strategy implementation are emphasised. Neely et al. (2002, p. 164) criticise the proposition that measures should be based on strategy. However, also they consider strategy an important aspect of performance that should be measured.

In the following chapters, three balanced performance measurement frameworks are presented. The Balanced Scorecard was chosen because it is the most widely known and used framework. The Performance Prism was chosen because it is a new framework and it includes many aspects related to intangible assets. Finally, the Dynamic Performance Measurement System was chosen because it is especially designed for small organizations.

3.1.2.2 Balanced Scorecard

As mentioned, the most commonly known and used performance measurement framework is currently the Balanced Scorecard by Kaplan and Norton. According to the framework, success factors are chosen based on an organization's vision and strategy (Kaplan and Norton, 1996). They are chosen from several perspectives in order to provide a balanced view of the organization. Usually (but not necessarily always), the four perspectives include financial, customer, process and learning and growth perspectives (see Figure 11). A characteristic of the Balanced Scorecard is that only the critical success factors are measured. When only the most important issues are measured, employees can focus their efforts on improving them. Performance measures are designed after the critical success

factors have been chosen. Performance measures include both financial and non-financial measures.

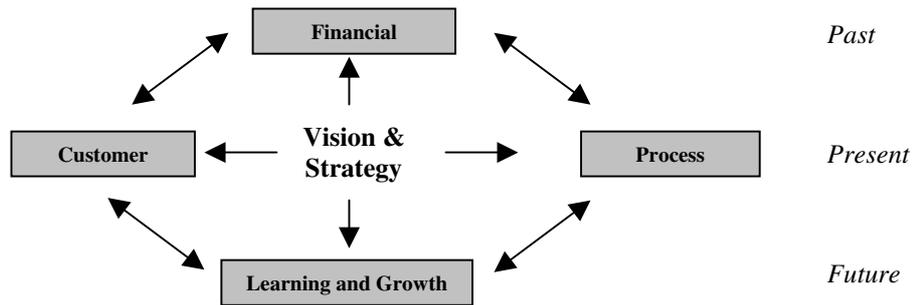


Figure 11. The Balanced Scorecard. (Kaplan and Norton, 1996, p. 9)

The Balanced Scorecard was intended in the beginning only as a measurement framework (Kaplan and Norton, 1992). However, it has later been developed also as a management framework (Kaplan and Norton, 1996). Kaplan and Norton (1996, p. 10) suggest that the Balanced Scorecard can be used as a tool in

- clarifying and translating vision and strategy,
- communicating and linking strategic objectives and measures,
- planning, setting targets and aligning strategic initiatives and
- enhancing strategic feedback and learning.

Especially the Learning and Growth perspective consists of issues that can be characterized as intangible success factors. For example, these include employee satisfaction, employee retention, motivation and information systems capabilities (Kaplan and Norton, 1996, pp. 126 - 146). In addition, intangible success factors can be measured in the Customer and the Process perspectives. Examples include, e.g., customer satisfaction, image and the factors related to innovation process (Kaplan and Norton, 1996, pp. 80, 97).

3.1.2.3 Performance Prism

The Performance Prism framework is one of the latest measurement models presented (see Neely et al., 2002). A decade has passed after the introduction of the Balanced Scorecard. Still, the Performance Prism framework has several characteristics similar to those of the Balanced Scorecard. However, there are also several differences. Figure 12 presents the basic structure of the Performance Prism. The shape of the prism represents the complexity and the different aspects of organizational performance.

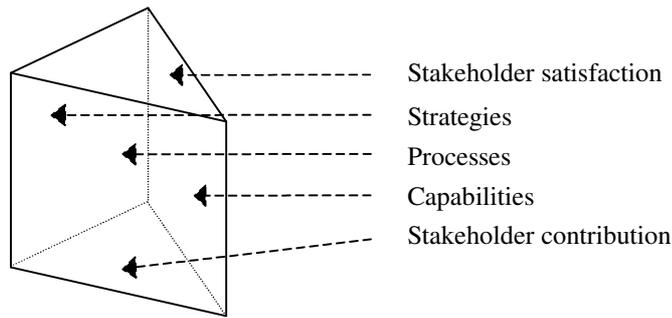


Figure 12. The Performance Prism. (Neely et al., 2002, p. xi)

Figure 12 shows the five facets of the Performance Prism. The top and the bottom of the prism focus on the organization's stakeholders. The questions regarding stakeholder satisfaction and contribution are "who are our key stakeholders and what do they want and need" and "what do we want and need from our stakeholder on a reciprocal basis?" After these questions have been answered, the next step is to consider what strategies are required for satisfying the needs of and achieving the contribution of the stakeholders. The next phase is to consider what processes are required to be put in place to enable the execution of the strategies. Finally, it should be considered what capabilities are required to be put in place to allow the operation of the processes. (Neely et al., 2002, pp. 160 - 181)

According to Neely et al. (2002, pp. 160 - 181), measures should be designed for each of the five facets. Choosing the measures should be carried out one stakeholder at a time. For example, the following questions and typical answers can be used when choosing what to measure regarding customers:

- What are our key customer groups and what do they each want and need?
- What does our organization want and need from these customers?
- What are our strategies for satisfying these sets of wants and needs?
- How will our internal business processes effectively and efficiently deliver them?
- Which particular capabilities do we need to build, maintain and improve in order to execute them? (Neely et al., 2002, p. 240)

Neely et al. (2002) also offer typical answers to the above questions and performance measures regarding each phase. The aim is to find causal chains that are derived step by step from the stakeholder facet to the capabilities facet. A major difference between the Performance Prism and the Balanced Scorecard is the starting point of designing the measurement system. In the Balanced Scorecard model, the design work starts with

discussing the organization's vision and strategy. The Performance Prism model starts with identifying various stakeholders, their desires and what the organization wants from them. After prioritising the stakeholders, different strategies are designed for addressing their needs. Although this process of determining what to measure differs somewhat from that of the Balanced Scorecard, the performance measures that are finally chosen seem quite similar.

3.1.2.4 Dynamic Performance Measurement System

Laitinen (1996) has developed a performance measurement model, Dynamic Performance Measurement System, especially for small companies. Later Laitinen (1998b) has stated that the model can be applied also to large companies. The basic idea of the model is to examine how the resources are transformed into profits in a company's processes. Figure 13 shows the components of the model.

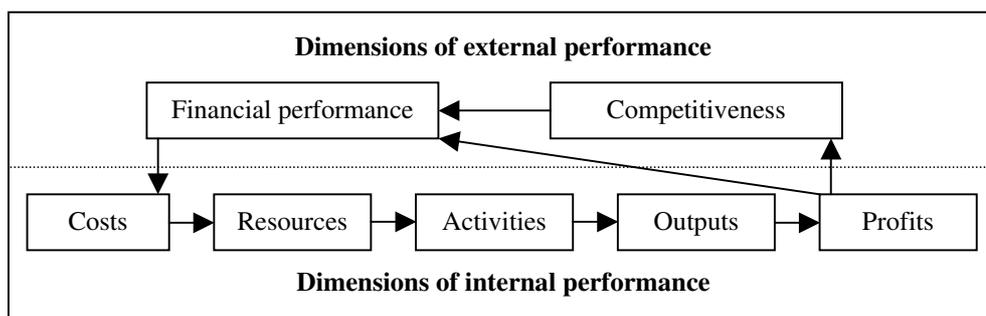


Figure 13. Dynamic Performance Measurement System. (Laitinen, 1998b, p. 296)

According to Laitinen (1996, pp. 22 - 50), the transformation of an organization's resources starts with allocating the company's financial assets as costs to various factors of production. The second phase focuses on the efficiency of the various factors of production. Next, the performance of activities is examined. Fourth, the properties of products are examined. Then, the profitability of products and customers is measured. After the five internal performance dimensions, the company's competitiveness in relation to competitors is examined. The final dimension is the financial performance of the company.

Laitinen's model addresses two problems related to designing performance measurement systems: choosing the dimensions of measurement and describing the relationships between the dimensions. The structure of the model itself provides solutions for the problems: The circulation of resources in a company is the basis for measurement dimensions and the

circulation also describes the relationships between the dimensions. (Laitinen, 1998b, p. 295) Clearly, Laitinen's model offers a possible and reasoned solution for choosing the measurement dimensions and describing the relationships between the dimensions. However, it has also been criticised for lacking the connection to strategy (Hudson et al., 2001, p. 1104). Laitinen's model offers yet another way of choosing the dimensions of performance measurement. From the point of view of designing and implementing measures, it remains unclear whether his model would be more (or less) practical than the previously presented models.

3.2 Intangible assets management

3.2.1 Knowledge management and intangible assets management

The research fields that, in addition to performance measurement, have contributed the most to the methods of measuring intangible assets and related factors are knowledge management and intangible assets management (or intellectual capital management). On many occasions it has been stated that the two fields are *the different sides of the same coin* (see e.g. Ståhle and Hong, 2002, p. 178). In a recent study, Zhou and Fink (2003) have examined the link between knowledge management and intangible assets, and also intangible assets management. First, they define knowledge management as managing organizational processes in order to create, store and reuse organizational knowledge while developing a knowledge culture to facilitate these processes with the ultimate goal of creating and maximising intangible assets. Second, they define intangible assets broadly and loosely as intellectual materials or assets that have been formalized, captured and leveraged through activities including acquiring new knowledge and creating valuable relationships to produce higher-valued assets. Third, the management of these intangible assets is simply called intangible assets management (or intellectual capital management). Finally, knowledge management and intangible assets management differ with respect to the purposes for which they are used. Intangible assets management is used at a strategic level to increase an organization's value-creating capabilities. Knowledge management is used at a tactical or operational level to, e.g., facilitate knowledge creation, capture and use. (Zhou and Fink, 2003, pp. 37 - 39).

From the point of view of this study, it is not very important to discuss the terms above any more thoroughly. The different interpretations and definitions can be taken as given, so in this work it is possible to focus on the measurement methods that have been developed. However, a description of the development of the research fields of intangible assets and knowledge management is given before the practical methods are presented. The presentation is based mainly on the “Intellectual Capital Literature Review” by Petty and Guthrie (2000, p. 161). Their presentation is supplemented by the latest developments of the most recent years.

During the early and mid 1980s the intangible assets were identified in the literature and the increasing gap between companies’ book and market values was discovered. Practitioners in organizations first started measuring and reporting on intangible assets during the late 1980s and early 1990s. During the mid 1990s a widely known report on intangible assets was first used by the Swedish company, Skandia. In addition, some of the classics in the field, e.g. by Sveiby (1997), Edvinsson and Malone (1997) and Roos et al. (1997), were published at the time. During the late 1990s intangible assets became a widely popular topic of research. Some large research projects regarding intangible assets, e.g. MERITUM and NORDIKA, were started. (Petty and Guthrie, 2000, p. 161) During the first four years of this century the research into intangible assets became even more active. An example of that was the establishment of the Journal of Intellectual Capital in the year 2000. At the same time, the management of intangible assets has become more common in companies. This is also partly indicated by the rise of companies that provide services related to intangible assets to customer companies. Such service-providing companies include e.g. IC Partners in Finland and Intellectual Capital Consulting Inc.

In quite recent years, intangible assets has become a subject for courses and study programmes in many universities. For example, in Finnish universities, intangible assets is a specific topic in the IC Group of the Swedish School of Economics and Business Administration and the Graduate School in Intellectual Capital and Knowledge Management organized by the universities of technology at Lappeenranta and Tampere. Thus, the topic is nowadays quite accepted in management science regardless of its young history.

In the Third International Conference on Performance Measurement and Management, “Performance Measurement Theory for Practice”, in Boston, United States, Baruch Lev held a keynote presentation entitled “Intangibles – What next?” (Lev, 2002). According to Lev, the first phase of intangible assets research was carried out during the 1990s. This resulted in the awareness of the importance of intangible assets. The management of intangible assets was mainly studied by observing best practices and surveying managers. Lev suggests that, in the forthcoming second generation of intangible assets research, the focus should be on organizational infrastructure (organizational assets) and the resulting productivity improvements. His suggestion is based on the idea that, first, certain intangible assets (e.g. image) are inert, i.e. they do not create value by themselves. Instead, business processes are needed in order to utilise the assets. Second, certain intangible assets are commodities (e.g. skilful employees), i.e. almost any company can acquire them. Thus, they should not offer any competitive advantage. Ultimately, it is the organizational infrastructure, i.e. business processes and operating systems, that makes the difference. Therefore, it also should be the focus of future research. It remains to be seen whether Lev’s suggestions will be followed through.

3.2.2 Frameworks for measuring intangible assets

3.2.2.1 Classifications of different measurement frameworks

There are several methods available for measuring intangible assets. There are even different classifications of the methods. Luthy (1998) divides the methods into two basic groups: component-by-component and organizational-level measurement methods. Component-by-component methods identify individual components of intangible assets (e.g. culture or employees’ competencies) and measure them. An example of these methods is the Intangible Assets Monitor¹² (Sveiby, 1997). Organizational-level measurement methods are based on determining the difference between a company’s value on the stock market and the value that the company’s balance sheet indicates. Luthy (1998) calls the organizational-level measurement methods also financial basis measurement. As the names suggest, the methods are financial and can be used only at the company level. They include methods such as Market-to-Book ratio and Tobin's q (see e.g. Stewart, 2001, p. 295).

¹² Individual measurement methods will be described later in this chapter.

Sveiby (2001a) has presented another classification for different methods of measuring intangible assets. His classification is based on the classification presented above. He has differentiated the methods where monetary valuation is or is not used regarding the component-by-component and organizational-level measurement methods. Based roughly on these four types, Sveiby has presented the following classification of measurement methods:

1. *Direct intellectual capital methods.* Components of intangible assets are first identified and then evaluated to estimate their monetary value. The methods include e.g. the Technology Broker (Brooking 1996) and Citation-Weighted Patents (see e.g. Bontis, 2001, pp. 56 - 57).
2. *Market capitalization methods.* The difference between a company's market capitalization and its stockholders' equity is calculated as the value of its intangible assets. The methods include, e.g., Market-to-Book ratio and Tobin's q (see e.g. Stewart, 2001, p. 295).
3. *Return on assets methods.* This group consists of various financial measurement methods that examine intangible assets and profitability. The methods include, e.g., Economic Value Added, EVA (Stewart, 1995), Human Resource Costing & Accounting (see e.g. Johanson, 1999) and Calculated Intangible Value (Stewart, 2001).
4. *Scorecard methods.* Components of intangible assets are first identified and then evaluated using mainly non-financial measures (i.e. monetary value is not estimated). The methods include, e.g., Skandia Navigator (Edvinsson and Malone, 1997), Value Chain Scoreboard (Lev, 2002), IC-Index (Roos et al., 1997), Intangible Asset Monitor (Sveiby, 1997) and Balanced Scorecard (Kaplan and Norton, 1992).

The second and third types of methods are primarily meant for measuring the intangible assets of a *company*. The first and fourth can also be applied to smaller organizational units because they are based on identifying the components of intangible assets. In this research, the main focus is on the component-by-component methods and especially on the Scorecard methods. Thus, the measurement methods that are designed to be used in managing intangible assets at business unit or department levels will be discussed in detail. The methods that can be used only at company level or that are mainly intended for evaluating the total monetary value of an organization's intangibles are not discussed in this thesis.

Sveiby's (2001a) classification does not include the two new measurement models proposed by the Danish Agency for Trade and Industry (2000) and the Meritum group (Meritum, 2001b). They both are component-by-component-type methods. They can also be considered as Scorecard-type methods. In addition, they are not only measurement models.

They also provide some guidance on the process of managing intangible success factors. These models are also presented later in this chapter.

3.2.2.2 Intangible Assets Monitor

The first actual intangible assets measurement framework presented was Sveiby's Intangible Assets Monitor (Sveiby, 1997). It focuses on measuring only intangible assets that are classified into employees' competencies, internal structure and external structure (see Table 5). According to the framework, each of the three groups of intangible assets should be measured from three different perspectives. They are growth and renewal (e.g. number of years in the profession), efficiency (e.g. value added per professional) and stability (e.g. average age of employees) of intangible assets.

Table 5. The Intangible Assets Monitor. (Sveiby, 1997, p. 165)

<i>Competence</i>	<i>Internal Structure</i>	<i>External Structure</i>
Indicators of growth / renewal	Indicators of growth / renewal	Indicators of growth / renewal
Indicators of efficiency	Indicators of efficiency	Indicators of efficiency
Indicators of stability	Indicators of stability	Indicators of stability

According to Sveiby (1997, p. 184), the first phase in designing a measurement system for intangible assets is to decide the main purpose of measurement. Measurement can be used for both internal and external purposes. However, the requirements for the measures may be different in these two cases and these needs should be the basis for choosing the measures (ibid., p. 164). Thus, an important consideration is who uses the measurement results. The second phase in designing measurements is to classify employees in two main groups: professionals, e.g. persons who plan and produce products and services, and support staff, e.g. accounting and administration personnel. Only professionals are measured under the employees' competence category. Similarly, under the internal structure category, only support staff are measured. This is based on the idea that professionals are the main human assets, whereas support staff represent the internal structure assets.

Sveiby (1997, p. 197) states that each of the three perspectives in the three groups of intangible assets should be measured by one or two measures. This should result in a report not exceeding one page in length. The choice of measures in a particular company depends

on the strategy. However, there is no explicit link provided between the strategy and choosing the intangible factors and their measures.

3.2.2.3 Navigator

Edvinsson and Malone (1997) have presented the Navigator measurement framework. The framework was developed at Skandia, a Swedish insurance and financial services company. As the name suggests, the framework is a managerial guidance tool. However, it is also the basis of an external intellectual capital statement that can be published with the annual statement. On the surface, the structure and the components of the Navigator (see Figure 14) seem quite similar to the Balanced Scorecard. However, there are some differences. The main one is the underlying idea in the Navigator, i.e. the attempt to measure an organization's intellectual capital. The measurement framework consists of five measurement perspectives, which represent the different components of intellectual and financial capital. The perspectives show the areas on which an organization should focus its efforts.

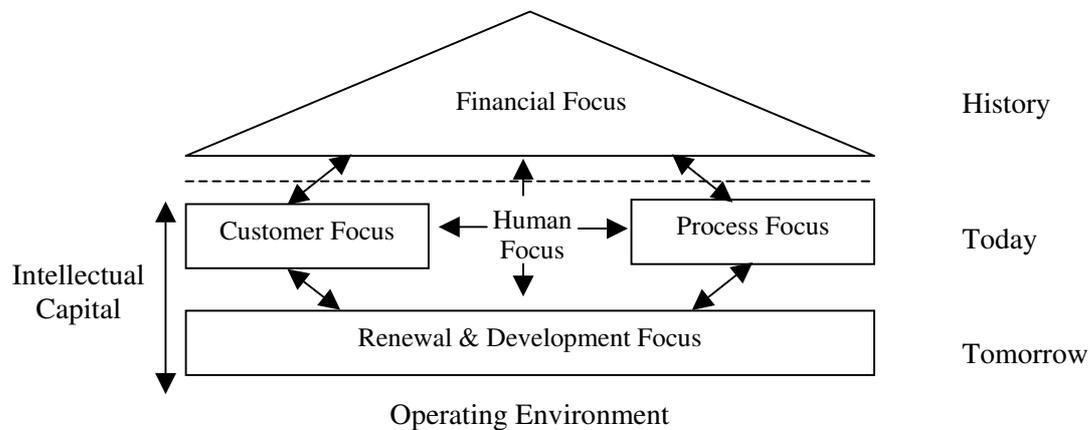


Figure 14. The Navigator measurement framework. (Edvinsson and Malone, 1997, p. 68)

As part of the measurement system, a large number of performance measures, altogether 111, are suggested for each perspective. The measures are of three types: direct count (e.g. number of employees), monetary value and percentage. It is suggested that the percentage measures, e.g. market share and customer satisfaction percentages, refer to the efficiency of the intangible assets. Edvinsson and Malone discuss the various measurement focuses and suggest performance measures. However, they do not discuss the factors that are measured as individual measurement objects. Thus, the framework does not offer clear principles for choosing the relevant measures for a particular situation. In fact, the authors try to come up

with general measures that are comparable across companies. (Edvinsson and Malone, 1997)

3.2.2.4 Meritum Guidelines

Meritum Guidelines (Meritum, 2001b) offer a framework for the management and disclosure of intangible success factors for any kind of organization. The Guidelines present a comprehensive model for the management of intangible assets (see Figure 15). The basic idea of the model is as follows. First, a company identifies and measures its critical intangible resources. Then, it carries out activities that are expected to develop the intangible resources and measures its intangible resources again. This way it is possible to assess the changes in the intangible resources in relation to the activities carried out.

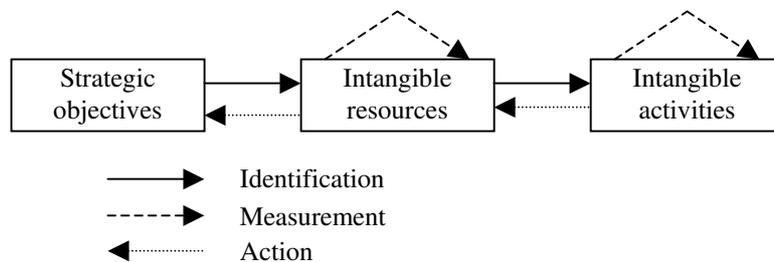


Figure 15. The Meritum model for the management of intangible assets. (Meritum, 2001b, p. 22)

The model for the management of intangible assets consists of three phases (Meritum, 2001b, pp. 4 - 22). The first phase is the identification of critical intangible success factors. This is carried out by first identifying the vision and the strategic objectives of the firm. Then, the intangible resources related to the strategic objectives should be identified and, further, the activities affecting those resources identified. Finally, support activities should be designed that can be used to monitor the intangible activities and their impact on the intangible resources. These different types of intangible success factors are illustrated in the example in Figure 16.

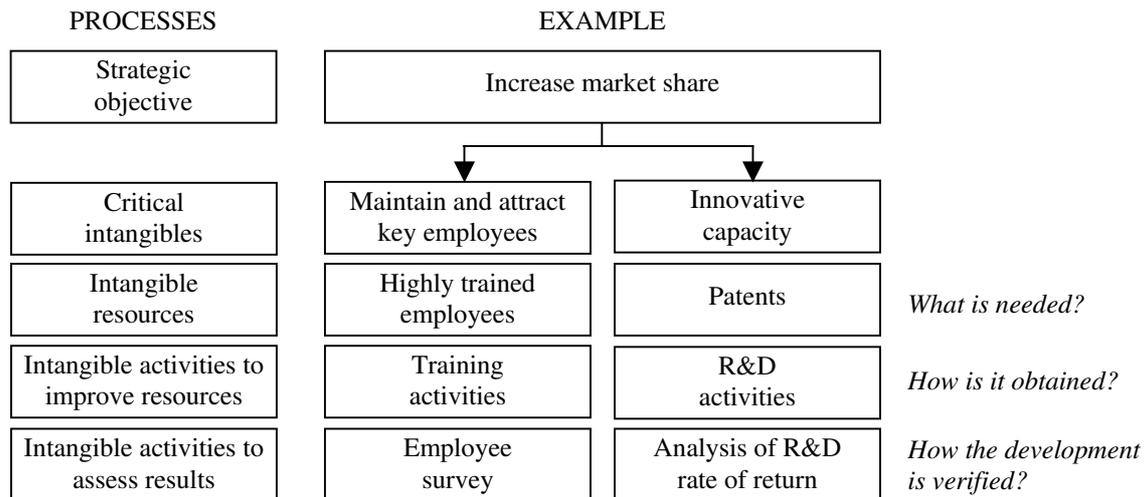


Figure 16. An example of the connections between strategy and various intangible success factors. (Based on Meritum, 2001b, p. 16.)

After identifying the intangible success factors, the second phase in the model for the management of intangible assets is defining the performance measures. Both the intangible activities and resources should be measured. Several criteria are suggested for the measures. They should be comparable over time and across companies, reliable, objective, truthful, verifiable and feasible. Various measures can be used: e.g. general, company specific, financial and non-financial. The measurement system includes a stable group of measures and a more dynamic set of measures that can be redefined according to management needs. (Meritum, 2001b, pp. 17 - 20) The information needed for the measurements can be collected from the organization's databases, internal documents and reviews, questionnaires and interviews for, e.g., employees and customers, the accounting system and various external sources (Meritum, 2001b, pp. 26 - 27).

The third phase is the actions based on the measurements. Based on evaluating the stock of intangible resources and the effect of the activities on the resources, the strength and weaknesses in the intangible resources are assessed. Additional activities can then be carried out if there is a need for improving the intangible resources. Different activities include developing intangible resources internally, acquiring them externally, increasing the value of existing intangible resources and assessing the effects of the previous activities. It is suggested that the action phase should be integrated with the organizational routines in order to achieve the necessary recognition of management. (Meritum, 2001b, pp. 21 - 22)

The information developed in the three phases of the intangible assets management process can be used to construct an Intellectual Capital Report (Meritum, 2001b, pp. 22 - 26). It can be used to communicate to stakeholders the company's abilities and resources. The report consists of three parts: description of a company's vision, summary of intangible resources and activities and the performance measures. As mentioned, the Meritum model can be used for both external and internal purposes. However, the authors of the Guidelines consider that the current guidelines are still too broad and that more work needs to be done in order to make them more detailed and specific (ibid., p. 6).

3.2.2.5 Danish Guidelines

The Danish Guidelines offer yet another way of designing performance measures for intangible assets (Danish Agency for Trade and Industry, 2000; Mouritsen et al., 2003a). The Guidelines are about constructing an intellectual capital statement. An intellectual capital statement is a report, similar to a financial statement, that focuses on the organization's knowledge management strategy. An intellectual capital statement can be designed based on four elements: a knowledge narrative, management challenges, initiatives and indicators. These components are illustrated in Figure 17. The Figure includes some example information that is taken from the intellectual capital statement of one case organization presented in the Guidelines report (Danish Agency for Trade and Industry, 2000, p. 44).

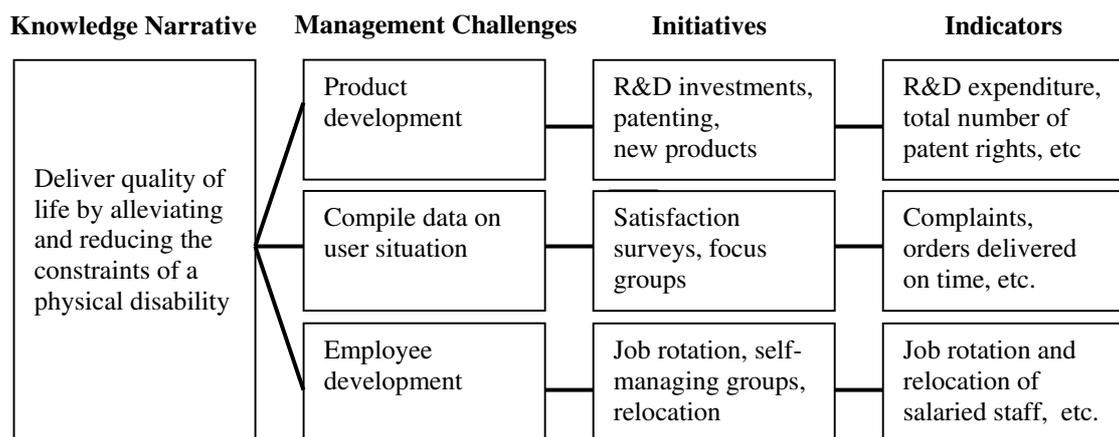


Figure 17. The knowledge management model of the Danish Guidelines. (Based on Danish Agency for Trade and Industry, 2000, p. 44, and Mouritsen et al., 2003a, p. 13.)

The knowledge narrative is a written description that explains the value of an organization's products and services to their users and shows the knowledge resources that are required for

producing it. Based on the knowledge narrative, certain management challenges arise that must be addressed. Management challenges include strengthening existing knowledge resources and acquiring new resources. The challenges are met with certain activities, i.e. initiatives. They concern the practical ways of resolving the management challenges. Performance measures, i.e. indicators, are designed based on the activities. (Mouritsen et al., 2003a, pp. 12 - 13)

Basically, the process of designing an intellectual capital statement advances starting from the knowledge narrative, through identifying management challenges, deciding initiatives and finally choosing performance measures. However, the process is iterative in practice (Mouritsen et al., 2003a, p. 18).

In choosing the performance measures of the intellectual capital statement, two questions can be asked: First, which indicators say something relevant about development in the organization's initiatives and management challenges? Second, can the indicators be translated into reliable and credible figures and be administered? (Mouritsen et al., 2003a, p. 43) Usually, three types of factors are measured: 1) effects (e.g. improvements in quality and customer satisfaction), 2) activities related to improving knowledge resources and 3) the resources themselves. Mouritsen et al. (2003b, p. 7) have presented an analysis model for intellectual capital statements that separates these different factors (see Figure 18). The example performance measures in Figure 18 are mainly taken from Mouritsen et al. (2003b).

<i>Evaluation criteria</i> <i>Knowledge resources</i>	Effects What happens?	Activities What is done?	Resources What is created?
	Employees	- Sickness absence - Loss of engineers	- Course days / person - Investment in training
Customers	- Customer satisfaction - Customer loyalty	- Meetings with customers	- Number of customers - International projects
Processes	- Number of accidents - On-time delivery rate	- Internal audits	- Number of internal auditors
Technologies	- Reliability of IT-based services	- IT costs in percentage of turnover	- Number of PCs per employee

Figure 18. Analysis model for intellectual capital statements. (Mouritsen et al., 2003b)

An intellectual capital statement is both a management tool used to generate value in an organization and a communication tool to communicate to stakeholders how an organization generates value from intangible assets (Mouritsen et al., 2003a, p. 7). In spite of this, the Guidelines focus on creating an external intellectual capital report. Although not explicitly stated, it would seem that the intellectual capital statement is mainly a company-level tool, i.e. business units do not prepare their own intellectual capital statements. A noticeable characteristic is the suggested length of the external intellectual capital statement: the total length can be 12 - 17 pages, which include a knowledge narrative (one to two pages) and the management challenges, initiatives and indicators (altogether six to ten pages) (Mouritsen et al., 2003a, p. 59). This highlights the fact that an intellectual capital statement is more than just a report of a measurement system.

3.2.2.6 Intellectual Capital Audit

Brooking (1996) has presented the Intellectual Capital Audit. The phases of the auditing process are presented in Figure 19. The designing of an audit starts by identifying the goals for measurement. A goal might be assessing the value of the enterprise or trying to validate the organization's ability to achieve its business goals. The focus of the audit depends on its goal; not all assets are audited. The aim is to restrict the audit to assets that are the most important from the point of view of the goals. The second phase is to determine which aspects of assets should be measured. For example, different aspects of the asset 'customer base' include size, repeat business, customer profile and brand loyalty. Only the most relevant aspects regarding the goals should be measured.

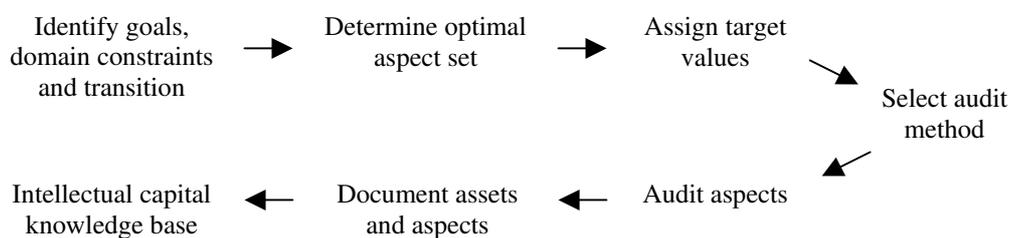


Figure 19. The Intellectual Capital Audit process. (Brooking, 1996, p. 88)

Once the aspects of assets to be audited have been chosen, the target values of each aspect are decided and a suitable audit method is chosen. Brooking's term 'audit method' refers to the methods of data collection and analysis, e.g. surveys, interviews or analysing sales.

When the audit is carried out, each aspect is assigned a value from one to five by assessing the audited result compared to the target. This makes it possible to compare the results in the case of different assets and to calculate an average intellectual capital index. (Brooking, 1996, pp. 98 - 129) This indexing approach is similar to that using the performance (sometimes productivity or objectives) matrix (see e.g. Rehnström, 1996). After the audit has been carried out, the results are documented and stored in an intellectual capital knowledge base from where the results can be accessed when needed.

3.2.2.7 IC-Index¹³

According to Roos et al. (1997, pp. 78 - 80), the IC-Index is a second-generation approach for the measurement of intangible assets. The IC-Index combines different individual measures in a single or a few total indices. 'Second-generation' refers to the fact that the measurement results, i.e. the indices, can be compared between companies and against financial results. Actually, the IC-index is just a method of consolidating measurements. It is based on typical measures of intangible assets (such as the ones suggested by Edvinsson and Malone, 1997). However, the authors suggest that, in addition to stock measurements, flow measurements should be carried out (Roos et al., 1997, p. 81). Stock measurement refers to measuring the amount of intangible assets. Flow measurement focuses on the transformation of intangible assets to financial capital and vice versa, and to other forms of intangible assets (ibid.). For example, a flow may start by investing financial capital in the education of employees, which is assumed to result in increased employee competencies. This, in turn, is expected to result in better customer service and, finally, in increased financial capital.

Roos et al. (1997, p. 54) point out three main problems in measuring the flows of intangible assets. First, a flow may include a long time delay: e.g. the time between educating and when the actions of employees are changed. Second, a flow may not be successful. For example, financial investments in information technology may not result in operational efficiencies if the system is not used. Third, the measurement units between different forms of assets vary, which makes comparisons quite difficult. The two first problems are related to the nature of the flows of intangible assets and there do not seem to be any easy solutions for them. The third problem can be addressed by transforming the measures into

¹³ IC-Index is a trademark of Intellectual Capital Services Ltd.

dimensionless ratios. For example, employee training can be expressed as a ratio of training hours per total working hours. The dimensionless ratios are the basis for consolidating the measures in the IC-index, which will be described shortly. In addition to these problems, the authors fail to explain how the flows should be measured. It is suggested that such a measure could, e.g., show whether the processes frustrate employees, i.e. whether there is a negative flow from process capital to attitude value (Roos et al., 1997, p. 81). It remains unclear how this can be measured.

The consolidation of measures includes weighting each dimensionless measure based on its importance and then uniting them into a single index. The detailed consolidation principles will not be examined here. Instead, the process of selecting which assets to measure, choosing measures and weighing them is discussed (see Table 6).

Table 6. Selection criteria for designing the measures of IC-Index. (Roos et al., 1997, p. 86)

Selection phase Selection criteria	1. Selection of capital forms		2. Selection of indicators		3. Selection of weights	
Organization's strategy	High importance		Low importance		Medium importance	
Business & industry characteristics	Medium importance		Medium importance		High importance	
Company specific factors	Low importance		High importance		Medium importance	

According to Roos et al. (1997, p. 86), the importance of different intangible assets varies regarding the strategy that is used. Thus, the factors that are measured should be chosen based on the organization's strategy. When individual measures are designed, company-specific conditions related to processes and day-to-day operations should be considered. Weighting measures refers to determining the relative importance of different forms of intangible assets. The authors suggest that the weights should be assigned based on the importance of the forms of intangible assets in the particular business of the company. As Table 6 shows, all three criteria have some kind of effect in the different phases of designing indicators.

3.2.2.8 Value Chain Scoreboard

The Value Chain Scoreboard is a framework for identifying critical success factors in a company's value chain. Value chain refers here to the process of innovation, which starts with discovery of new products (and services), proceeds with developing and testing the products and, finally, results in the commercialisation of the products. (Lev, 2001, p. 110)

Figure 20 presents the basic structure of the Value Chain Scoreboard.

A. Discovery and Learning	B. Implementation	C. Commercialisation
<p>1. Internal renewal</p> <ul style="list-style-type: none"> - Research and development - Work force training and development - Organizational capital, processes 	<p>4. Intellectual property</p> <ul style="list-style-type: none"> - Patents, trademarks and copyrights - Licensing agreements - Coded know-how 	<p>7. Customers</p> <ul style="list-style-type: none"> - Marketing alliances - Brand values - Customer churn and value - Online sales
<p>2. Acquired capabilities</p> <ul style="list-style-type: none"> - Technology purchase - Spill-over utilization - Capital expenditures 	<p>5. Technological feasibility</p> <ul style="list-style-type: none"> - Clinic tests, authorities' approvals - Beta tests, working pilots - First mover 	<p>8. Performance</p> <ul style="list-style-type: none"> - Revenues, earnings and market share - Innovation revenues - Patent and know-how royalties - Knowledge earnings and assets
<p>3. Networking</p> <ul style="list-style-type: none"> - R&D alliances and joint ventures - Supplier and customer integration - Communities of practice 	<p>6. Internet</p> <ul style="list-style-type: none"> - Threshold traffic - Online purchases - Major internet alliances 	<p>9. Growth prospects</p> <ul style="list-style-type: none"> - Product pipeline and launch dates - Expected efficiencies and savings - Planned activities - Expected breakeven and cash burn rate

Figure 20. The Value Chain Scoreboard. (Lev, 2001, p. 111)

According to Lev (2001, p. 115), the Value Chain Scoreboard can be used for both internal decision-making and external reporting. The nine boxes regarding the different phases of the value chain include areas that should be measured. Not all phases are relevant for all companies. For example, not all companies use online trading or have patents and copyrights. In these situations, they obviously are not measured. Lev suggests three criteria for the measures in the Scoreboard. First, they should be quantitative. Qualitative information is intended to be used only to support the quantitative information. Second, measures should be standardized in order to be able to make comparisons between companies. Third, measures should be empirically linked to value. This empirical linking

refers to establishing, e.g. statistically, the association between the measurement results and results of some financial measures.

3.2.2.9 Knowledge Audit Cycle

The Knowledge Audit Cycle is a method for assessing and managing the knowledge dimensions of an organization’s capabilities (Marr and Schiuma, 2001). The Knowledge Audit Cycle consists of four phases that are illustrated in Figure 21.

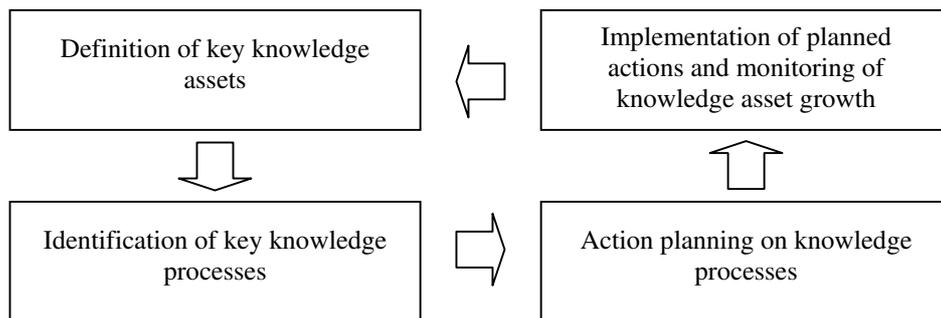


Figure 21. The Knowledge Audit Cycle. (Marr and Schiuma, 2001, p. C4B/25)

The Knowledge Audit Cycle starts with the identification and definition of key knowledge assets. The Knowledge Assets Map (see Chapter 2.3.2) can be used to identify different aspects of knowledge assets. Choosing which knowledge assets are measured should be linked to strategy. This can occur either top-down, i.e. key knowledge assets are identified based on the strategy, or bottom-up, i.e. knowledge asset measures are used to identify an organization’s core competencies on which the strategy can be based. The second phase is the identification of the knowledge processes, e.g. storing, sharing, codification and generation of knowledge, corresponding to the key knowledge assets. These processes are used to maintain or increase the knowledge assets. In the third phase, actions related to, e.g., enhancing the knowledge processes, are planned to improve the knowledge assets. The fourth phase of the cycle consists of implementing the planned actions and monitoring improvement using the measures of knowledge assets. (Marr and Schiuma, 2001, pp. C4B/14 - 25)

Marr and Schiuma (2001, pp. C4B/18 - 20) suggest several criteria and design principles for the measures of knowledge assets. First, as already mentioned, the measures should be linked to strategy. Second, the user and the situation in which each measure is used should

be considered when designing measures. Third, the measures should be “meaningful, simple and comprehensive”. This implies the following points:

- Measures focus on an organization’s key knowledge areas.
- Measures are relevant for the end-user.
- Measures are practical and manageable, i.e. they are easy to understand and there are not too many measures.
- Measures are built on existing data sources.
- The factors being measured can be affected.

The fourth criterion that Marr and Schiuma suggest is that there should be a balanced set of knowledge asset measures. This means that there should be measures representing each of the six categories in the Knowledge Assets Map (stakeholder relationships, human resources, physical infrastructure, culture, routines and practices and intellectual property). Finally, it is suggested that the measurement results should be aggregated into a single or a few indices using, e.g., the IC-Index approach.

3.3 Other methods

3.3.1 Human resources accounting

Human resources costing and accounting (HRCA) has been studied for thirty years already. It is a tool for managing human resources of an organization. It can be divided into two components: human resources accounting and costing for human resources. Human resources accounting deals with measuring various aspects of human resources. Costing for human resources is about analysing the financial utility of activities, e.g. recruiting, of human resources management. (Johanson, 1999, p. 1; Johanson et al., 1999)

It is clear that human resources form a central part of an organization’s intangible assets. When examined separately from the organization’s working environment and technology, human resources can be classified into three components which consist of several subcomponents: the number of employees (total annual work years, hours, euros, overtime, subcontracting etc.), employees’ personal properties (age, sex, education, competencies, health, motivation etc.) and work community (awareness of targets, personal relationships, communication, employee satisfaction, salary etc.) (Ahonen, 2000, pp. 44 - 50).

HRCA is mainly a managerial tool. The components presented in the list above can be considered as success factors and can be measured. The literature suggests many performance measures related to human resources. They include, e.g., personnel costs, sickness-related absence, amount of education per employee, revenue per employee, employee satisfaction survey, internal promotion rate and executive retention (Becker et al., 2001, p. 74; Strömmer, 1999, p. 301).

During recent years, human resource statements have become popular with companies and public sector organizations. For example, about 150 Finnish publicly listed companies prepared a human resource statement in the year 1999 (Strömmer, 1999, p. 299). Ahonen (2000) has presented the human resource statement model that is used for external reporting. The report consists of four components. First, the business idea, vision and strategies are the starting point of the personnel report. Second, a personnel statement and balance sheet present personnel-related costs and assets. An example of a personnel statement is presented in Table 7. Third, the personnel narrative is a description of personnel assets and their development. Fourth, key indicators can also be used to express the personnel assets and their development in a compact form.

Table 7. An example of a personnel statement. (Ahonen, 2000, p. 56)

Income	xxx €
<hr/>	
Personnel costs	
Wage-related costs	xxx €
Personnel turnover costs	xxx €
Sickness absence costs	xxx €
Accident costs	xxx €
Overtime costs	xxx €
Holiday costs	xxx €
Other personnel costs	xxx €
Subcontracting	xxx €
Other expenses	xxx €
<hr/>	
Profit / Loss	xxx €

According to Ahonen (2002), the human resource statement has been a tool for top management and its main purpose is to provide information. He also states that a common framework for all companies probably cannot be designed. Rather the measures related to personnel should be derived from each organization's own needs.

3.3.2 *Quality management frameworks*

Quality management frameworks are management models that are based on the idea of improving quality in order to improve competitiveness and business results. The frameworks include quality award models, e.g. the Deming Prize, the Malcolm Baldrige Award, the Australian Quality Prize and the European Quality Award, and quality standards, e.g. the ISO 9000 series (Hardjono et al., 1997, pp. 46 - 52). Although the main idea of the frameworks is quality, the approach is comprehensive and includes various elements in organizations. Many of these elements are overlapping with the ones presented in the performance measurement and intangible asset management frameworks.

According to Hardjono et al. (1997, p. 53), the different quality management frameworks have many similarities. Thus, in this chapter only one framework, the EFQM excellence model, is presented in order to illustrate the view of quality management on the research issue. The European Quality Award is based on the EFQM (European Foundation for Quality Management) excellence model. The EFQM model is presented in Figure 22. It is a management model for increasing competitiveness and business excellence. The EFQM model is suited for large and small companies as well as public sector organizations. It offers no explicit guide for action. Instead, it is based on certain characteristics of excellency (EFQM, 1999):

- *Results orientation:* There is a need to achieve results that will satisfy the needs of various stakeholders.
- *Customer satisfaction:* Customers determine the quality of products and services.
- *Leadership and constancy of purpose:* Management provides the organization with an inspiring and motivating atmosphere.
- *Management by processes and facts:* An efficient way of operating is achieved when the processes, activities and their interconnections are understood and managed.
- *People development and involvement:* Personnel's assets are utilized and participation is encouraged with the help of supporting organizational culture.
- *Continuous learning, innovation and improvement:* Excellence is based on managing and sharing knowledge as well as on culture that fosters continuous improvement and innovation.
- *Partnership development:* Mutually advantageous relationships between partnerships based on trust and knowledge sharing make the organization's activities efficient.
- *Corporate social development:* Ethical ways of operating and exceeding the expectations of stakeholders in society serve the organization's interest in the long run.

The model consists of nine areas which are presented in Figure 22. The five ‘Enablers’ show how an organization is operating and the four ‘Results’ show what has been achieved using the enablers. The nine areas represent the most important aspects of an organization’s activities and results on which the management should focus its attention. The total quality of an organization is examined by assessing the level of quality in each of the nine areas.

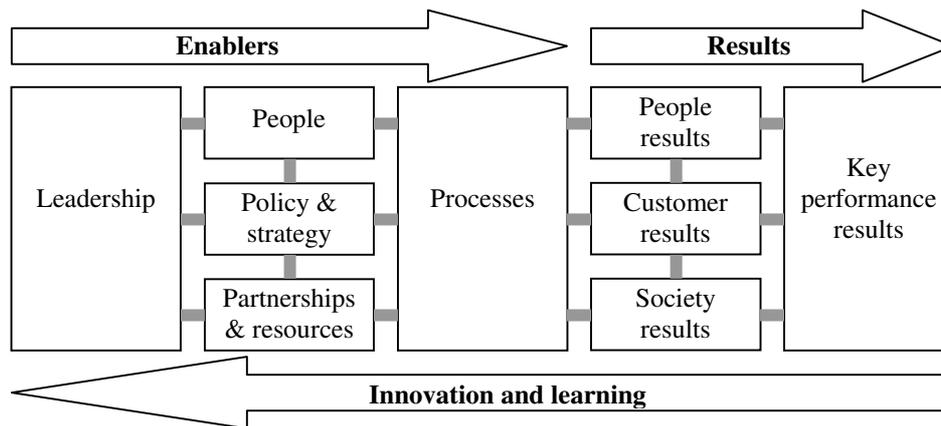


Figure 22. EFQM excellence model. (EFQM, 1999, p. 8)

The EFQM excellence model is based on self-assessment of an organization’s results and activities. Each of the nine categories of the model is assessed based on certain criteria. For example, regarding the policy & strategy area, the following questions are put: Are the policies and strategies based on current and future needs of the stakeholders? Are they developed, assessed and updated? Are they communicated and transformed into action? (EFQM, 1999)

The excellence model overlaps with the common intangible asset frameworks. The five Enabler areas could be interpreted as relating to the typical three classes of intangible assets: human assets, relational assets and structural assets. This is illustrated in Table 8.

Table 8. The five Enabler areas of the EFQM in relation to the typical three classes of intangible assets.

Intangible assets	Human assets	Relational assets	Structural assets
EFQM Enablers	People	Partnerships & resources	Processes, Leadership and Policy & strategy

The Results areas of the EFQM model suggest various factors that should be measured (EFQM, 1999, pp. 22 - 29). They include, e.g., a general impression of the organization, products and services, customer loyalty, motivation and satisfaction of employees, societal responsibility, financial results and the performance of processes. Many of the factors can be considered as intangible. However, actual performance measures are not suggested.

3.4 Examining the different approaches for measuring intangible success factors

3.4.1 Role of performance measurement methods

The performance measurement research field and especially the balanced performance measurement models contribute a lot to the measurement of intangible success factors. First, there are many process models for designing measures and measurement systems (see e.g. Leinonen, 2000; Olve et al., 1999; Toivanen, 2001). Second, there are many measurement frameworks that provide the basis for identifying and choosing the factors to be measured (see e.g. Kaplan and Norton, 1996; Neely et al., 2002). Third, several measures of intangible success factors have been used for years under the label of non-financial measures (e.g. customer satisfaction, employee satisfaction, customer retention and company image). Many of the issues that are examined seem the same in practice although they are presented differently in performance measurement and intangible assets literature.

The performance measurement literature includes experiences and knowledge regarding different types of performance measures, typologies of measures (subjective, objective, financial, non-financial etc.) and ways of measuring (direct, indirect). Also the criteria of sound measures (validity, reliability etc.) have been developed during many years. These issues are discussed further in Chapter 4.1.

From the point of view of measuring intangible success factors, the performance measurement frameworks have certain shortcomings. For example, many of the components of intangible assets as well as other intangible success factors are not discussed in the models. On the other hand, the models only aim to offer a general framework for balanced measurement. Therefore, this is not a shortcoming as such. More information, however, is needed regarding the intangible measurement objects if these frameworks are to be used

also for measuring intangible success factors. Similarly, there is a lack of measures of many of the intangible success factors.

The Balanced Scorecard has been criticized for several reasons. For example, Bontis et al. (1999) have noted that the Balanced Scorecard includes the customer perspective but it lacks connection to other relevant stakeholders, e.g. subcontractors, the local community and alliance partners. The Balanced Scorecard has received very much attention in the literature and sometimes the whole performance measurement research field seems to have been considered only as the Balanced Scorecard model. For example, the Performance Prism is a stakeholder-based measurement model which takes into account employees and other stakeholders (Neely et al., 2002). Thus, much of the critique does not apply to all performance measurement frameworks.

Performance measurement frameworks suggest that some intangible success factors are included in the measurement system. The intangible success factors included in the measurement system are examined as a part of other important business objectives, e.g. financial issues. Thus, intangible assets are not considered a separate area of management, but rather they are examined as an integral part of management. On the other hand, it can be questioned how comprehensively a balanced measurement system can cover the intangible assets of an organization if, e.g., only 15 – 25 measures are used at a certain organizational level and only a part of them measure intangible success factors. In addition, it is unclear how well suited the balanced performance measurement frameworks are for identifying which intangible assets should be measured. These issues seem to require more research and practical experiences.

3.4.2 Role of intangible asset measurement methods

The intangible asset measurement research field has produced several measurement approaches for intangible assets (see also Table 9):

- The scorecard-type multi-perspective measurement frameworks (Navigator, Intangible Assets Monitor and Value Chain Scoreboard)
- Management-system-type frameworks (Meritum Guidelines and Knowledge Audit Cycle)

- Report-focused frameworks (Danish Guidelines)
- Other frameworks (IC Audit, IC-Index)

The variety of methods can be seen as positive because there are many options that you can choose, depending on the needs and preferences of a particular case. On the other hand, there are so many models that it may be confusing. According to Bontis et al. (1999, p. 400), it is difficult to see the contributions of the different methods “suggesting slightly different variations of the same idea”. It seems that many of the methods are basically the same with only small differences. Thus, it can be questioned whether all of the models are actually needed. In Table 9, the frameworks are compared to each other regarding the main purpose and contribution of each model.

Sveiby’s (1997) Intangible Assets Monitor and the Navigator by Edvinsson and Malone (1997) are maybe the two best known pioneer frameworks in the field of measuring intangible assets. They provide the basic structure for measurement systems. According to Bontis (2001, p. 47), a key contribution of the Navigator is the pioneering work done to define the components of intangible assets. He also identifies some problems with the framework. First, it aims to develop general measures of intangible assets, which is in contradiction with the fact that the critical intangible assets are often organization-specific. Second, the Navigator has a balance sheet approach to measurement. The measurement results offer only a snapshot view of the stock of intangible assets and the model does not take into account the dynamic flows of intangible assets. Finally, according to the framework, computers and information systems are a part of the structural capital of the organization. This, however, includes a supposition that the computers etc. are actually used by employees to create value. Computers do not do anything by themselves and thus measuring the number of computers is not necessarily a valid indicator of structural assets.

Table 9. Comparison of methods of measuring intangible assets.

Measurement framework	Main purpose	Main contribution to measurement of intangible success factors
<i>Intangible Assets Monitor</i> (Sveiby, 1997)	Measurement of intangible assets for management and external reporting	Pioneer in the field, the basis of many current measurement solutions
<i>Navigator</i> (Edvinsson and Malone, 1997)	Measurement of intangible assets for management and external reporting	Many example measures, the first attempt towards general measures of intangible assets
<i>Meritum Guidelines</i> (Meritum, 2001b)	Management and external reporting	Comprehensive management model for intangible assets, measurement focus on activities in addition to assets
<i>Danish Guidelines</i> (Mouritsen et al., 2003)	Constructing an external report of intangible assets, also internal use possible	Focus on company-specific management challenges is the basis for measurement
<i>Intellectual Capital Audit</i> (Brooking, 1996)	General auditing model of intangible assets, many purposes of use	The process model of measurement, implementation varies depending on the need
<i>IC-Index</i> (Roos et al., 1997)	Tool for consolidating measurement results	Principles for transforming individual measures of intangible assets into a single or a few indices
<i>Value Chain Scoreboard</i> (Lev, 2001)	Measurement of intangible assets for management and external reporting	Connecting intangible assets to a company's value chain which is used as the basis for measurement
<i>Knowledge Audit Cycle</i> (Marr and Schiuma, 2001)	Measurement of intangible assets for management purposes	A process of managing intangible asset development

Mouritsen et al. (2001, pp. 361 - 365) have criticised the traditional three-way model of intangible assets which divides them into human assets, relational assets and structural assets. Models based on the three-way split include, e.g., the Intangible Assets Monitor and the Navigator. The first problem is that the tree-way model is functional, i.e. it separates the interrelated components of intangible assets from each other. This leads to the situation that it is not possible to see how the various assets relate to strategic objectives and to each other. Another problem is that they lack prescriptive qualities. According to Mouritsen et al., this means that using the model it is not possible to answer questions like what is the right portfolio of assets, what actions are carried out related to the assets and what is the effect of the actions. Not surprisingly, they suggest that their own model, the Danish Guidelines, has better descriptive and prescriptive qualities (see Chapter 3.2.2.5). One obvious difference between the Intangible Assets Monitor and the Danish Guidelines is that the report on the measurement result of the former is only one page in length while the report on the latter is 12 - 17 pages (Mouritsen et al., 2003a, p. 59; Sveiby, 1997, p. 197).

Brooking's (1996) Intellectual Capital Audit and the IC-Index by Roos et al. (1997) also represent the pioneering efforts in the field. The IC Audit offers a general model for assessing intangible assets. The model is very general, which makes it quite versatile. The specific characteristic of the IC-Index is that it offers a tool for consolidating the measurement results. In addition, an advantage of the IC-Index approach is, according to Bontis (2001, p. 49), that it focuses on the flows of the stock of intangible assets. However, despite the fact that Roos et al. (1997) suggest that the flows should be taken into account in the measurements, they fail to provide concrete tools for doing it. Another disadvantage of the method is that determining the weights needed to form the index requires subjective assessments (Bontis, 2001, p. 49).

The Danish and the Meritum Guidelines for measuring intangible success factors represent the products of two large research projects. Guimón (2002) has compared the Danish and the Meritum Guidelines and discovered the following similarities and dissimilarities. According to him, the Meritum model is also a management model, whereas the Danish model is mainly for constructing an intellectual capital statement. The frameworks consist of different concepts, e.g. report vs. statement and intangibles management vs. knowledge management. However, the meanings of the concepts are quite similar despite the different names. Del Bello (2002) has also compared the guidelines for constructing an intellectual capital statement. He states that the similarities appear greater than the dissimilarities. Similar features include, e.g., that the reports are designed not only to estimate the value of intangible assets but also to explain its role in creating value in the organization.

Finally, two of the measurement approaches from the beginning of the new millennium are the Value Chain Scoreboard by Lev (2001) and the Knowledge Audit Cycle by Marr and Schiuma (2001). As the name suggests, the specific characteristic of the Value Chain Scoreboard is that it relates the intangible assets to the organization's value chain. The specific characteristic of the Knowledge Audit Cycle is that, similarly to the Meritum approach, it highlights the management process of intangible assets.

In conclusion, there are several measurement approaches that have several similarities but also certain specific characteristics. A suitable approach can probably be chosen according to the needs of a particular situation. In addition, the properties of different models can be integrated. For example, Marr and Schiuma (2001) suggest that the measures developed

using their Knowledge Audit Cycle could be consolidated using the IC-Index methodology. This chapter consisted mainly of comparing the different approaches that have been developed. However, the intangible assets research field has also other contributions for the measurement of intangible success factors. They include the definition of the components of intangible assets (see e.g. Brooking, 1996; Edvinsson and Malone, 1997; Mayo, 2001; Marr and Schiuma, 2001; Roos et al., 1997; Ståhle and Grönroos, 2000), which identifies factors that can be measured, and several measures of intangible success factors (see e.g. Edvinsson and Malone, 1997; Mouritsen et al., 2003a, pp. 68 - 72).

3.4.3 Role of other methods

Human resources costing and accounting includes many measures related to personnel that have been used in companies as part of human resources management and reporting (Ahonen, 2000, pp. 137 - 138; Becker et al., 2001, pp. 71, 74; Strömmer, 1999, p. 301). Such measures include, e.g., hours or money used for education per employee, personnel costs, personnel costs per total costs, personnel turnover and sickness absence (Strömmer, 1999, p. 301). Many of the measures have been used for years in practice. Naturally, the HRCA measurement tools focus only on personnel, while the other parts of intangible assets are neglected.

A key challenge in measuring intangible success factors is that there may be no data sources available for the measures. If human resource related data or measurements are carried out, e.g., by the human resources department, the same data can be used also in designing other measures. Bontis et al. (1999) criticize human resource accounting for being subjective and lacking reliability of the measures. On the other hand, many of the measures examine hours or monetary values, which suggests that objective measurement would be quite easy. Bontis et al. consider that one of the positive aspects of human resource accounting is the fact that the measures are often calculated in financial terms and that it has been used quite a lot.

Quality management frameworks offer another approach for comprehensive performance management of an organization. They are also quite widely used. For example, the EFQM is the most widely used organizational framework in Europe (EFQM Internet Site, 2003). EFQM can be used, e.g., as the basis for IC statements (see Bukh et al., 2002). Quality

management models do not offer much in terms of performance measures. However, they include various perspectives also regarding intangible assets. It can be questioned whether the relevant intangible success factors can be identified using the quality management frameworks. A positive aspect of the quality management frameworks from the point of view of measuring the intangible success factors is their comprehensiveness and the inclusion of intangible success factors as part of the important issues to be managed.

Both HRCA and the quality management frameworks are partially overlapping with performance measurement and intangible asset management frameworks. In terms of measuring intangible success factors, it would seem that neither of them are sufficient by themselves. They offer support and supplementation for balanced performance measurement and intangible asset management frameworks.

3.4.4 Comparing the approaches to each other

A lot has been written regarding the properties of various measurement approaches. According to Sveiby (2001b), the Balanced Scorecard and the Intangible Assets Monitor have many similarities regardless of the different theoretical approaches. A main difference between the models is that the Balanced Scorecard is a strategy-focused model, while the Intangible Assets Monitor is a knowledge-focused model. However, from the practical point of view, they both consist of three non-financial and one financial measurement perspective.

Also Mouritsen et al. (2002) have compared the Balanced Scorecard with intellectual capital measurement methods. Before reviewing their insights, a few observations must be taken from their study. First, there are some conceptual problems: the comparison is made between the Balanced Scorecard and intellectual capital. They state (2002, p. 22) that “Balanced Scorecard and intellectual capital are performance management systems...” Commonly the concept intellectual capital refers to something that is managed and measured, not to a management system. It becomes implicitly clear that intellectual capital refers here to the integrated properties of the Intangible Assets Monitor, the IC-Index and the Navigator. This results in another questionable issue in the paper. Is it reasonable to compare just one performance measurement framework, the Balanced Scorecard, against several intangible asset measurement frameworks which themselves have many differences?

The above-mentioned issues should be borne in mind in reviewing the results of Mouritsen et al. (2002). The similarities between the Balanced Scorecard and the intellectual capital measurement methods include considering non-financial measures as relevant, integrating strategy as part of the measurement system, pursuing a comprehensive view of the organization and paying attention to intangible assets. Also Mouritsen et al. identify the theoretical viewpoint, competitive strategy in the Balanced Scorecard and competence strategy in the intellectual capital models as the greatest difference. This starting point results in several smaller differences including, e.g., varying views as regards competencies and the origins of competitiveness.

Another example of the similarities and differences between performance measurement methods and intangible asset measurement methods considers the 'flows of intangible assets' and the 'causal relationships between success factors'. The Balanced Scorecard and some other performance measurement models identify and acknowledge the (causal) relationships between the factors being measured (Kaplan and Norton 2001, pp. 69 - 71); e.g. how the quality of products increases customer satisfaction. Strategy maps can be used to visualise these relationships (Kaplan and Norton 2001). The same phenomenon has also been discussed in terms of the flows or transformations between various assets (Roos et al., 1997, p. 81); e.g. how employees' competencies can be transformed to customer satisfaction and further to profits, i.e. how human assets are transformed to relational and financial assets. This discussion also includes questions regarding the time lag between the cause and the effect or the time that the flow takes. Also the uncertainty regarding the actualisation of the flow (cause-effect) is considered in both fields. Thus, despite the different terminology, the phenomenon seems to be the same in practice.

Both human resource accounting and intangible asset measurement frameworks can be audited by examining the process for designing the measures. It can be observed whether the process has followed prescriptions. However, nothing can be said about the measurements. (Bontis et al., 1999, p. 400) The same thing probably applies also to designing any other type of performance measures.

Hannula et al. (1999) have compared the concepts Total Quality Management and the Balanced Scorecard. The two concepts include many similar characteristics, e.g. the

emphasis on customer satisfaction and other perspectives of performance. However, they can be understood and used in different ways in practice. Sometimes one can be used to implement the other. The main differences are that Total Quality Management is a management philosophy consisting of several tools for performance improvement, while the Balanced Scorecard is only a strategic management framework. Rastas and Einola-Pekkinen (2001, p. 74) have identified some differences between the Balanced Scorecard and the EFQM excellence model that are presented in the following table.

Table 10. Comparison of the properties of the Balanced Scorecard and EFQM excellence model. (Based on Rastas and Einola-Pekkinen, 2001, p. 74.)

Balanced Scorecard	EFQM excellence model
Context-dependent	Context-independent
Prescriptive	Descriptive
Focus on future performance	Focus on current performance
Focus on critical success factors	Comprehensive

As has been discussed above, there are several measurement frameworks with some similarities and some differences. Based on the properties of the measurement frameworks presented, three main purposes of measurement frameworks can be identified. Firstly, a measurement framework describes how to identify and choose the intangible success factors to be measured based on the organization's objectives. Secondly, it provides a guideline regarding the structure of the measurement system. Thirdly, it offers guidance regarding the use of the measurement system in managing the intangible success factors. These are all important tasks. The different measurement frameworks described above have strengths and weaknesses regarding the three main tasks. However, as the term suggests, a measurement framework provides only the general idea of how to construct the measurement system. In other words, they do not have to, and they cannot, solve all problems related to measurement, e.g. how to design individual measures or how to ensure their effectiveness in practice. The process of designing, implementing and using the measures is needed to support the practical application of the measurement frameworks.

In conclusion, the different approaches discussed have both strengths and weaknesses regarding the measurement of intangible success factors. Different frameworks may be preferred in different situations. Thus, comparison of the methods is quite difficult. When they are considered from the point of view of what they contribute to measuring intangible

success factors, the following conclusion can be stated: many of the measurement frameworks presented have similar purposes and discuss the same issues despite the different terminology and the slightly different approaches. Many of the frameworks include clear guidelines regarding the general structure of the measurement system. However, what is less precisely expressed in the models and where the biggest problems lie in practice is the practical designing of performance measures of intangible success factors. The process of designing, implementing and using the measures seems to be common to each measurement framework. In Chapter 5.2, the measurement frameworks are assessed from the point of view of the process, i.e. the different phases of measurement.

3.5 Summary of measurement frameworks

This chapter attempts to provide a summary of all the measurement frameworks discussed. It is a difficult task since there are so many different methods. Therefore, the summary is a simplistic view of the situation.

The balanced performance measurement frameworks include the measurement of intangible success factors in addition to other factors. However, the frameworks lack in-depth understanding of the intangible success factors. In comparison, the frameworks for measuring intangible assets focus on identifying an organization's intangible success factors. However, they often lack means for designing the performance measures of intangible success factors and sometimes lack the connection to other, e.g. financial, success factors. The other two approaches discussed, i.e. human resources costing and accounting and the quality management frameworks, supplement the balanced performance measurement and intangible asset management frameworks but may not be sufficient for measuring intangible success factors by themselves.

There is one common problem in applying all the frameworks discussed: designing the measures of intangible success factors is difficult. Therefore, the results of this research can be useful within each of the frameworks. The remaining part of this research focuses on individual measures and the process of designing measures of intangible success factors. The frameworks discussed here will be examined from the point of view of what they can contribute to the process of designing measures of intangible success factors.

4 PERFORMANCE MEASURES AND PHASES OF MEASUREMENT

This chapter has two central themes. The first is the individual performance measures including the criteria of sound measures, different approaches for measuring and, especially, the measures of intangible success factors presented in the literature. The second is the process of measurement focusing on the different phases of measurement. These two themes describe how and what kind of measures can be designed, implemented and used based on current knowledge. Also the problems related to each phase of measurement are discussed.

4.1 Performance measures

4.1.1 *Criteria for the properties of performance measures*

4.1.1.1 **Classifications and criteria of sound performance measurement**

A performance measure should have certain properties in order to be sound. There can be found many criteria for sound performance measurement in the literature. In this chapter, the criteria proposed by different researchers are presented. They are compared to each other and this will result in choosing the criteria that will be used in the latter parts of this study.

Emory (1985, pp. 94 - 101) has presented three characteristics of sound measurement. They are *validity*, *reliability* and *practicality*. Each of the characteristics consists of at least two sub-characteristics. Emory's criteria are for sound measurement in general, not just for performance measurement. However, performance measures must also fulfil the general criteria of sound measurement.

Validity refers to how precisely a measure succeeds in measuring the object that it is intended to measure. *External validity* refers to the way measures can be used in different situations, i.e. how they can be generalized. *Internal validity* refers to the way a measurement instrument is able to measure what it is assumed to measure. In other words, external validity refers to how one measure maintains its validity in different situations, while internal validity focuses on one measure's validity in a particular situation. (Emory, 1985, p. 94)

Internal validity consists of three characteristics: content validity, criterion-related validity and construct validity. It is important to see that these different forms of validity are interrelated. *Content validity* refers to the way a measure is able to measure all the important characteristics of the measured object or phenomenon. For example, if a questionnaire is assumed to measure a company's image and it succeeds in covering all the important characteristics, it has good content validity. *Criterion-related validity* refers to how well a measure succeeds in measuring some empirical situation. For example, how well a measure can predict an event or how well a measure can describe a current situation. The name 'criterion-related validity' refers to the fact that certain criteria are needed in order to determine if the measure's results describe truthfully the empirical situation. *Construct validity* can be determined by making other propositions that should correspond to the measurement results. This is needed when empirical validation of the measure is otherwise difficult to attain. (Emory, 1985, pp. 95 - 98) The construct validity of a performance measure can be determined by examining how the assumed relationships of the factor being measured relate to the corresponding empirical relationships (Lönqvist, 2000). The empirical relationships can be observed, e.g., by examining the correlations in the measurement results.

The basic question of the validity of performance measures is due to the nature of measurement: a factor can be measured in many different ways because there are many different concrete representations for any abstract factor (Judd et al., 1986, p. 42). These representations of factors are called variables. They are only partial representations of factors, but they are used because they can be measured. 'Operational definitions' describe the way the measurements of variables are made. (Judd et al., 1986, p. 43) For example, if a factor is 'employee satisfaction', then a measured variable could be the 'employee turnover percentage' or 'the amount of absence per employee in one year'.

The problem with operational definitions is that one operational definition cannot provide an exactly accurate measure of one factor. Operational definitions include irrelevant features and fail to include all the relevant features of a factor. (Judd et al., 1986, p. 45) That is why it is necessary to be able to determine whether the measure is valid. The effect of irrelevant and relevant features in different operational definitions of a factor is illustrated in Figure 23. In the figure, the operational definitions cannot describe the entire underlying factor.

They describe different parts of the factor while also including features that do not belong to the factor. In practice, operational definitions are simply called performance measures or management ratios.

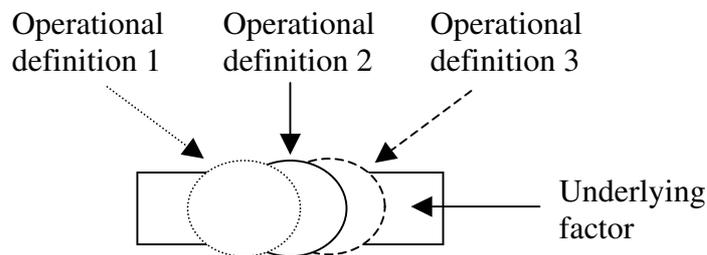


Figure 23. An illustration of different operational definitions describing the same underlying factor. (Judd et al., 1986, p. 53)

Earlier in this chapter, three basic types of validity – criterion-related validity, content validity and construct validity – were introduced. Although these types of validity were introduced separately, they are both theoretically and operationally interrelated (Emory, 1985, p. 97). In fact, Cronbach and Meehl (1955, pp. 281 - 282) actually consider these different types of validity as different ways for validating measures. They regard construct validation, criterion-related validation and content validation as different validation procedures which attempt to determine a measure’s validity using different methods and points of view.

Standards for Educational and Psychological Testing (1985, p. 9) state that the validity of a measure is a unitary concept. This means that although the evidence of validity can be accumulated in different ways, validity always refers to the degree to which that evidence supports the inferences that are made from the measurement results. It is not actually possible to separate the different types of validity, but it is possible to present different types of evidence of the validity of a measure.

According to Standards for Educational and Psychological Testing (1985, p. 9), *validity refers to appropriateness, meaningfulness, and usefulness of the specific inferences made from measurement results*. It means that validity is not the property of a measure itself, but rather it describes the quality of conclusions based on the measurement results (Nummenmaa et al., 1997, p. 205). This definition is quite different from the earlier definition of validity, which described validity as the extent to which a measure is able to measure what it is intended to measure. Nevertheless, the newer definition suits well the

field of performance measurement. In discussing the validity of performance measures, validity of a measure refers to the extent to which a chosen measure is able to measure what is required *in that particular situation*. Although many performance measures are used in numerous organizations, it is not self-evident that measures are used correctly or are suitable in every situation. Thus, it seems necessary to consider also whether a measure is used correctly in order to be able to make the right assumptions based on the measurement results.

According to Nummenmaa et al. (1997, p. 204), the validity of a measure cannot be confirmed with just some once-only research result. The proof of a measure's validity is accumulated gradually. On the other hand, Standards for Educational and Psychological Testing (1985, p. 13) state that it is incorrect to even talk about the validity of a measure, because no measure is valid in all situations or for all purposes. Therefore, the term 'validation' can be used to refer to the process of gathering proof of a measure's validity in the particular case that it is being used in.

In addition to validity, reliability of a measure is an important property. According to Emory (1985, pp. 98 - 100), reliability refers to how accurate and precise results the measure provides. A reliable measure provides consistent results. If a measure is very unreliable, it cannot be valid. However, a reliable measure can be invalid. Reliability consists of two characteristics: stability and equivalence. *Stability* of a measure means that measurement results are consistent over time for the same measurement object. *Equivalence* of a measure means that measurement results are consistent when different people are using the measure and when different samples are being measured.

Measurement results contain two basic types of measurement error: random and non-random error. Random error results from incidental phenomena that affect measurement results. For example, a car's speedometer may show just as readily two kilometres per hour too much or too little. The amount of random error is inversely related to the degree of reliability of a measure. (Carmines and Zeller, 1981, p. 13)

Non-random error is systematic, i.e. the results of a measure are systematically incorrect in the same way. For example, a car's speedometer always shows five kilometres per hour too much. Results with non-random error suggest invalidity of the measure. Non-random error

results from the fact that a measure is representing something other than the intended factor. (Carmines and Zeller, 1981, pp. 14 - 15) The relationship of validity and reliability is shown in Figure 24.

In Figure 24, four cases with different validity and reliability are presented. The curves representing the distribution of measurement results are just simplified illustrations of wide-spread and narrow-spread distributions. If the centre point of the distribution of results is where the target value is, the results have good validity. If the results are distributed in a narrow area, the results have good reliability. If either reliability or validity of a measure is proven, the other can still be good or bad.

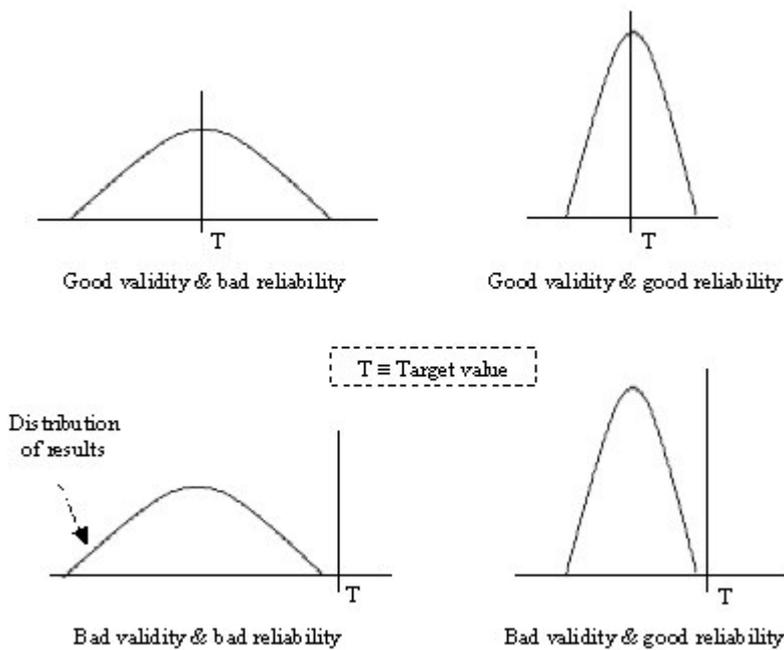


Figure 24. Illustration of the natures of validity and reliability.

These simple curves also illustrate another property of both validity and reliability. Validity and reliability are not absolute concepts. This means that there is no specific value or limit that would determine whether a measure is reliable, unreliable, valid or invalid. It is easy to determine validity or reliability when the results of reliability tests or validation are either very good or very poor. Nevertheless, the results may also show validity or reliability of average quality.

Both validity and reliability are important criteria for performance measures. As presented earlier in this chapter, realization of one criterion is not very useful if the other is not

realized. They are also quite closely related in practice, especially if validity is considered as the appropriateness of the decisions based on the measurement results (as suggested earlier). The reliability of measurements is obviously also of significance for the decisions based on the measurement results.

Practicality refers to the practical or operational properties of a measure. There are three characteristics for a practical measure. They are economy, convenience and interpretability. *Economy* of a measure refers to the cost of using the measure. *Convenience* of a measure refers to the easiness of using the measure. *Interpretability* of a measure refers to how easy it is to understand the results of a measure. (Emory, 1985, pp. 100 - 101) According to Hannula (1999, p. 78), practicality refers to the cost effectiveness and the benefit-burden ratio of a measure.

Hannula (1999, p. 78) has presented four criteria for sound productivity measurement. Although his criteria were meant for sound *productivity* measurement, it would seem possible to use these criteria also for sound performance measurement in general. Hannula's framework is the same as Emory's with the exception that it includes the criterion of relevance which is not included in Emory's framework. *Relevance* refers to the value and usefulness of a measure for the users of the measure (Hannula, 1999, p. 78). If a measure is irrelevant for the users of the measurement results, it obviously is not a very good measure.

Sink (1985, p. 68) has presented nine criteria which can be used in assessing the quality of a measure or a measurement system. These criteria are presented and briefly described in the list below.

1. *Validity*. A measure is valid if it measures what it is intended to measure.
2. *Accuracy and precision*. A measure is accurate and precise if it can precisely determine the statistical variations of a particular phenomenon.
3. *Completeness or collective exhaustiveness*. This refers to a measurement system's ability to describe all the important characteristics of the measured phenomenon.
4. *Uniqueness or mutual exclusiveness*. There should not be overlapping measures in a measurement system.
5. *Reliability*. Measurement process and measures should provide consistently valid results over time.
6. *Comprehensibility*. Measures should be simple and understandable, but they must also give the information that is needed.

7. *Quantifiability*. Measures should be quantified in order to give better understanding of their behaviour.
8. *Controllability*. It is useful to measure only such phenomena that management has control over.
9. *Cost effectiveness*. Measures and measurement systems should be cost effective.

Vehmanen (1979) presented in his doctoral thesis eight different criteria that help to describe the properties of performance measures. The criteria are represented in three groups, which are the philosophical, factual and functional approach. His viewpoint is measurement-theoretical.

First, the philosophical approach refers to the properties of the object that is measured. The philosophical approach includes the criterion for the existence of a property and the criterion for the identification of a property. *The criterion for the existence of a property* means that a measurement object really exists in practice. *The criterion for the identification of a property* means that the person performing the measurement should have some kind of understanding of the object that is measured. For example, when measuring economic success, you have to define what “economic success” means and also you have to quantify it somehow. (Vehmanen, 1979)

Second, the factual approach refers to the properties of the measurement system. The factual approach includes four criteria: the criterion for the validity of a magnitude, the criterion for the representation of relations, the criterion for the uniqueness of scales and the criterion for the meaningfulness of statements. (Vehmanen, 1979)

The criterion for the validity of a magnitude means that the results of a measure describe just the particular property that it is assumed to measure. A measure’s validity must be ensured both empirically and theoretically. *The criterion for the representation of relations* refers to the way the results of a measurement system and the properties of a measurement object relate. For example, when measuring two different objects, the relations between the measurement results and between the actual phenomena should correlate. *The criterion for the uniqueness of scales* will be fulfilled if the numeral values of a measure can be changed without losing important information. For example, you can increase the value of the results on an ordinal scale by the same number without changing the order between the original

results. *The criterion for the meaningfulness of statements* means that measurement results should be obtained in such a way that they correspond to some explicit empirical phenomenon. (Vehmanen, 1979)

Third, the functional approach deals with the way the measurement results are used. The functional approach consists of two criteria: the criterion for the relevance of measurements and the criterion for the reliability of measurements. *The criterion for the relevance of measurements* means that measurements are relevant only when they are used in a decision-making process. *The criterion for the reliability of measurements* is fulfilled when a decision based on the measurement results will not change depending on the different ways of determining the value of the measurement. (Vehmanen, 1979)

Contrary to Vehmanen's theoretical approach, Neely et al. (2002, pp. 38 - 42) have proposed a very practical set of questions for determining the properties of measures. They suggest that the "Ten tests of good measures" could be used to assess the soundness of measures. The tests are described in the list below.

1. *The truth test.* Are we measuring what we set out to measure?
2. *The focus test.* Are we measuring *only* what we set out to measure?
3. *The relevance test.* Are we definitely measuring the right thing?
4. *The consistency test.* Do the results vary depending on who makes the measurement?
5. *The access test.* Can the data be accessed and understood?
6. *The clarity test.* Is there any ambiguity in interpreting the results?
7. *The so-what test.* Can the data be acted upon?
8. *The timeliness test.* Can the data be analyzed and accessed rapidly enough?
9. *The cost test.* Is the measure worth the cost incurred?
10. *The gaming test.* Is the measure likely to encourage undesirable behaviors?

As presented, there are different kinds of criteria for sound measures. Although there are differences, there are also similarities. In fact, the basic criteria are almost the same. The differences are mainly due to the degree of detail with which the criteria are described. In Table 11, the criteria of three classifications are embedded in Emory's framework, which is supplemented by the relevance criterion proposed by Hannula. Most of the criteria can be associated with the four basic criteria.

Table 11. Comparison of various classifications of the criteria of sound measures.

	<i>Neely et al.</i>	<i>Sink</i>	<i>Vehmanen</i>
<i>Validity</i>	<ul style="list-style-type: none"> - The truth test - The focus test 	<ul style="list-style-type: none"> - Validity - Completeness or collective exhaustiveness 	<ul style="list-style-type: none"> - The criterion for the validity of a magnitude - The criterion for the uniqueness of scales - The criterion for the meaningfulness of statements
<i>Reliability</i>	<ul style="list-style-type: none"> - The consistency test 	<ul style="list-style-type: none"> - Accuracy and precision - Reliability 	<ul style="list-style-type: none"> - The criterion for the representation of relations - The criterion for the reliability of measurements
<i>Practicality</i>	<ul style="list-style-type: none"> - The access test - The clarity test - The timeliness test - The cost test 	<ul style="list-style-type: none"> - Comprehensibility - Cost effectiveness 	
<i>Relevance</i>	<ul style="list-style-type: none"> - The relevance test - The so-what test 	<ul style="list-style-type: none"> - Controllability 	<ul style="list-style-type: none"> - The criterion for the relevance of measurements
<i>Other</i>	<ul style="list-style-type: none"> - The gaming test 	<ul style="list-style-type: none"> - Uniqueness or mutual exclusiveness - Quantifiability 	<ul style="list-style-type: none"> - The criterion for the existence of a property - The criterion for the identification of a property

In Table 11, certain criteria are presented as ‘Other’ criteria because they did not fit any of the four other categories. The gaming test refers to a measure’s property that it cannot be manipulated by, e.g., the employees that are measured. The quantifiability criterion suggests that a measure should be quantitative, not qualitative. Uniqueness or mutual exclusiveness is not a criterion of a single measure. It refers to the composition of the measurement system. Vehmanen’s two criteria, the criterion for the existence of a property and the criterion for the identification of a property, are quite different from all the other criteria. They are not criteria for measures. Instead, they relate to the factor that is measured. This is an important consideration in the context of this thesis.

4.1.1.2 Criteria of sound measures in the context of this research

Because of the nature of intangible success factors, both the criterion for the existence of a property and the criterion for the identification of a property should be considered. The first criterion states that a factor must exist for it to be measured. It can quite certainly be stated that intangible factors, e.g. an organization’s culture, exist. However, the factors are intangible (or non-physical) in nature. Therefore, it is not self-evident that they can be

measured simply because they exist. The criterion for the identification of a property suggests that a factor must be able to be defined and quantified. This is a tough criterion for intangible factors. For example, what are the dimensions of a certain organization's culture and how can they be quantified? It would seem that whether a factor is measurable must be assessed case by case. It may also be possible that all intangible success factors are not quantifiable.

When considering the criteria of sound measures in relation to intangible success factors and their measures, it seems clear that most of the criteria are difficult to meet. Many of the intangible assets are related to social phenomena, e.g. relationships between stakeholders. These phenomena consist of many aspects and they are difficult to define exactly. Thus, the validity of the measures of intangible success factors may be very difficult to assess when the factor being measured cannot be precisely defined. Also the reliability of some measures of intangible success factors may be difficult to ascertain. Many of the intangible assets are such that they may require external judgment in order to be evaluated. For example, an organization's image is a phenomenon that has to be determined by stakeholders external to the organization, e.g. customers. These types of phenomena are often measured subjectively, i.e. the measurement is based on the opinion of a person or a group of people (cf. Agrawal, 1990, p. 267). In subjective measurement, results can vary depending on the person providing the assessment. Therefore, there is a risk of unreliability of the results.

Relevance and practicality are criteria that are difficult to assess on a general level because they are highly situation-specific and they are subjective criteria. Basically, measures of intangible success factors could be highly relevant to managers if the measures are experienced as good and they focus on important factors. On the other hand, the measures may be considered irrelevant if they are considered problematic or are not considered to measure the important factors. Practicality would seem to be similarly dependent on the situation.

Hudson et al. (2001, p. 1106) have suggested that because of the resource constraints of small and medium-sized companies the performance measures require some different criteria than large companies. The following criteria should be emphasized in small and medium-sized companies: measures should be clearly defined, have an explicit purpose, be

relevant and easy to maintain and be simple to understand and use. They clearly highlight the importance of practicality of the measures.

It should be noticed that the criteria of sound measures are not absolute. In practice, performance measures are compromises between different criteria (see e.g. Uusi-Rauva and Hannula, 1996). For example, improving the validity and reliability may result in increasing the cost of measurement. Thus, the optimal solution must be assessed between the accuracy of the result and the cost incurred. In fact, the general criteria of sound measures may have to be considered against factors related to the specific situation. For example, different organizations have different amounts of financial resources to be used for measurement.

Another important factor related to the measurement situation is the purpose of measurement. It is suggested that the criteria of a particular measure change, depending on the purpose for which the measure is used (Lönqvist and Mettänen, 2002). A common example is the different criteria for cost information used by authorities and by product costing (Johnson and Kaplan, 1987, pp. 125 - 135). When measures are used primarily for decision-making, controlling and communication outside the organisation, the measurements must be exact. In other words, validity and reliability are most important when exact quantification is needed. When measures are used to guide or teach employees, the measurements do not necessarily have to be exact. It is more important that the measure focuses employees' attention on the right issues. Thus, validity and reliability are not as important as they are when used in quantification. One possibility for assessing the criteria of measures in relation to practical needs is to consider the benefits and burdens caused by the measurement (see Table 12).

Table 12. The benefits and burdens caused by measurement. (Lönqvist and Mettänen, 2002)

Benefit	Burden
A) Valuable information - relevance (timeliness, important information) - accuracy (validity and reliability) B) Guiding effect - measuring emphasises important factors	A) Cost of measurement - data collection (manual or automatic) - cost of implementation and maintenance B) Disturbance to employees - active vs. passive role in data collection C) Interpretation problems - difficulties in understanding the measures

The relevance and importance of a success factor may affect the way the criteria of measures are assessed. If a factor is considered as essentially important and information related to the factor is required, then a measure with less than optimal properties may have to be accepted if better options are not available. A common example of this situation is related to indirect measures (see Chapter 4.1.2), which may have poor validity but which can provide some information regarding an important phenomenon that otherwise could not be described at all.

A summary of the factors affecting the soundness of a performance measure is given in Figure 25. The presentation is not comprehensive. However, it illustrates that there are different elements in addition to the generally known criteria of sound measures.

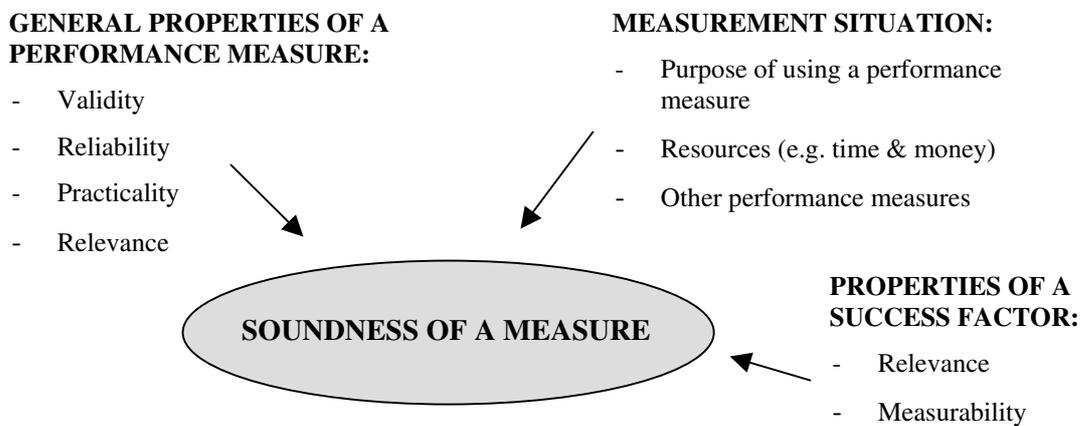


Figure 25. Factors affecting the soundness of a performance measure.

In the following chapters, the measures of intangible success factors are mainly assessed against the general criteria of sound measures (validity, reliability, practicality and relevance). In the case of empirical examples of measures, also other criteria are considered.

4.1.2 Different approaches to measurement

“... (A)nything can be measured to a useful degree, especially in business environment. ... The real question is not whether something can be measured, but whether it is worth the effort and money to do it.” (Kaydos, 1999, pp. 19 - 20)

As the quotation above states, some kind of performance measure can usually be designed for any kind of factor. Such a measure may be, e.g., too expensive or not reliable enough in

order to be used in practice. In principle, however, almost anything can somehow be measured.

There are many ways for measuring a factor. Kaydos (1999, p. 19) presents a classification of four different types of approaches to measurement. First, *qualitative or subjective* refers to measurement in which numbers on a scale are assigned by human judgment. Second, *quantitative or objective* refers to a typical measurement situation in which physical objects or phenomena, i.e. countable units, are quantified. Third, *attribute measurement* refers to examining whether a certain criteria, i.e. attribute, exists or not. For example, does a product meet its quality criteria or not? Finally, *variable or continuously variable* measurement occurs on a continuous scale, e.g. temperature or business profits. (Kaydos 1999, p. 19) The first and second as well as the third and fourth categories are opposites of each other. A measure is either subjective or objective.

Previously, management accounting has been quite financially oriented (see e.g. Kaplan and Atkinson, 1989). Thus, when measures based on non-financial factors, e.g. number of defects and delivery time, became popular, a dichotomy into financial and non-financial measures was created. Another dichotomy is between standard or general and situation-specific measures (see e.g. Meritum, 2001b, p. 18). Certain measures, e.g. revenues or delivery time, can be considered as standard. This means that they are, at least to some extent, comparable between companies. Other measures, e.g. a customer satisfaction survey or an employee competence measure, are designed specifically according to the needs of each measurement situation and, thus, cannot be compared between companies. Measurement results can be compared with historical results of the same measure. (Kaydos, 1999, p. 19)

One approach typically used in productivity measurement is to measure indirect (vs. direct) factors (Kaydos, 1999, p. 16 - 17; Sink, 1983; Uusi-Rauva, 1996b, pp. 67 - 70). If a factor cannot be measured directly, it may be possible to measure it indirectly. This is possible to carry out by identifying factors that are associated with the primary factor. For example, productivity can be measured indirectly by examining, e.g., defect rates, unused capacity, material scrap, unnecessary transport, poor atmosphere and waiting times (Uusi-Rauva, 1996b, p. 69). Despite the fact that the validity of indirect measures is obviously not very good, they are commonly used. They are considered quite practical to implement and use.

For example, the time or money used on education is often considered easier to measure than learning or the increase in competencies.

According to Kaydos (1999, p. 18), the choice of measurement technique, i.e. how the measurement is carried out, should be based on three questions. First, what questions must be answered using the measure? Second, what techniques are feasible for producing the measure? Third, what is the most economical and reliable method for carrying out the measurement? Two main approaches for producing a measure of an intangible success factor can be identified: objective and subjective measurement. In objective measurement, the result is obtained by directly examining the factor being measured. A measurement instrument, e.g. a clock or some counting device, can be used to carry out the measurement. An objective measure assigns a score in proportion to the extent that the property being measured exists (Agrawal, 1990, p. 267). Subjective measurement can be defined as measurement that is based on the opinion of a person and can vary from person to person (ibid.).

Subjective measures of intangible success factors are usually based on questionnaires and evaluations. Questionnaire-based measures are typically used, e.g., for measuring customer satisfaction and image. The questionnaires and evaluations have to be designed specifically for each measurement situation. Designing them may be difficult; it takes resources and the validity and reliability of such an instrument is difficult to ensure. In addition, a survey must be conducted and the data analyzed to get the measurement results. Also the collection of data consumes resources and there is always some inconvenience for the persons answering the questionnaire. Thus, there are clearly some problems in using these types of measures. However, they have also several positive properties. The questionnaires and evaluations can be well suited to the specific needs of an organization because they are usually designed case by case. In addition, they can be used to measure intangible phenomena directly, which is often not possible using objective measures. At least theoretically, a subjective measure can have good validity because it can describe the underlying success factor comprehensively. For example, a questionnaire with several questions can capture several aspects of an intangible asset. (Lönnqvist and Mettänen, 2002; Rastas and Einola-Pekkinen, 2001, pp. 187 - 188)

Typical examples of objective measures include the measures of financial or operational factors, e.g. manufacturing cost or lead-time. The measurement units are often amounts or percentages. A problem in measuring the intangible success factors is that there are often no measurement instruments available that would enable objective measurement. It has been stated that objective measures offer a narrow and accurate picture of the underlying success factor (see e.g. Rastas and Einola-Pekkinen, 2001, pp. 187 - 188). Thus, the content validity (i.e. how comprehensively the factor is described) of an objective measure may not be good when the factor being measured is intangible. Usually, the practicality, e.g. cheapness, is considered as a positive aspect of objective measures.

Previously, and even nowadays in colloquial language, measures have been divided into hard and soft measures. Hard measures are typically related to monetary issues, e.g. costs. Soft measures include, e.g., measures of co-operation, atmosphere and measures related to personnel. (Uusi-Rauva, 1987, pp. 28 - 29) This division seems to be related mainly to the type of factors that are measured. Thus, the division into hard and soft measures is quite similar, although more colloquial, to the division into measures of tangible and intangible success factors.

4.1.3 Measures of intangible success factors suggested in the literature

Some of the measures of intangible success factors have been used for years as part of the normal performance measurement of companies. These measures include, e.g., employee and customer satisfaction indices (see e.g. Kaplan and Norton, 1996, p. 71, 130; Neely, 1998a, p. 10; Uusi-Rauva, 1996a, p. 15). However, these issues are usually considered non-financial measures, not measures of intangible success factors. For example, Kaplan and Norton discuss measuring both financial and non-financial factors. Thus, although not mentioned as such, intangible success factors, e.g. customer satisfaction and competencies, are also considered to be an important part of balanced performance measurement (Kaplan and Norton 1996). It should be noticed that similar features are also included in other balanced performance measurement frameworks (Tuomela, 2000, pp. 97 - 102). In the performance measurement literature, there is only a fairly limited number of measures of intangible success factors.

Some authors, usually from the field of intangible assets management, present the measures of intangible success factors as indicators that relate to a certain theme rather than to any specific success factor. For example, according to Mettänen (in Hannula et al., 2002, p. 131), all the following measures are related to ‘committed and stable personnel’: average age of employees, the number of employees over fifty years, the number of employees left in relation to employees recruited, the number of temporary employees in relation to permanent employees, the number of employees with less than two years experience and so on. The multitude of measures illustrates the difficulty of designing good measures of intangible issues, which can be defined in many ways. Some authors do not even distinguish between the success factors and the measures. For example, Edvinsson and Malone (1997) present lists of indicators related to various aspects of intangible assets without discussing what the factors are that are measured. This approach does not follow the typical logic in which specific success factors are first defined and then the measures are defined for them. The strength of the intangible assets research field is that there is a vast number of measures that can be used and further developed.

The literature regarding human resource costing and accounting also includes a lot of measures of intangible success factors (see e.g. Becker et al., 2001; Strömmer, 1999). However, they are naturally almost exclusively related to human resources. Thus, they do not cover certain areas of intangible assets, e.g. relational intangible assets and some structural assets such as patents. A positive aspect of the measures of intangible success factors developed in the field of human resource costing and accounting is that there is a lot of experience of measurement in practice and that it has been studied for such a long time. Therefore, some of the measures, e.g. those related to personnel costs, have become quite standard.

The following table illustrates some of the measures of intangible success factors presented in the literature. The examples are collected from several sources (Ahonen, 2000, pp. 137 - 138; Becker et al., 2001, p. 71, 74; Edvinsson and Malone, 1997, pp. 151 - 155; Hannula et al., 2002, pp. 131 - 137; Kaplan and Norton, 1996; Mouritsen et al., 2003a, pp. 68 - 72; Strömmer, 1999, p. 301; The Measures Catalogue, 2003). They are classified into three groups according to the type of intangible assets they are related to. In addition, the organizational level for which the measure is supposed to be best suited is suggested. Some

of the measures are more suitable for use at company level than in smaller business units. The division used here is the same that has been used, e.g., by Becker et al. (2001, p. 74).

Table 14. Performance measures of intangible success factors.

Intangible Success Factor	Performance Measure	Most suitable organizational level of use (Company [C] and / or business unit [BU])
<i>Human-related factors</i>		
Education	Hours (h) or money (€) used for education per employee	C & BU
Employee competence	Percentage of employees with academic degrees (%)	C
Employee satisfaction	Employee satisfaction survey (%)	C & BU
Personnel costs	Personnel costs (€), personnel costs / total costs (%)	C & BU
Recruiting efficiency	Average cost of recruiting (€)	C (& BU)
Stability of personnel	Average duration of employment (years)	C & BU
<i>External factors</i>		
Brand recognition	Brand recognition (%) based on a market survey	C
Customer loyalty	Average duration of a customer relationship (years)	C & BU
Close relationship with suppliers	Number of co-operation contracts (number)	C & BU
Customer satisfaction	Customer satisfaction survey (%)	C & BU
Delivery accuracy	Products delivered to customers on time (%)	C & BU
Global operations	Ratio of international and domestic sales (%)	C & BU
<i>Structural factors</i>		
Development of processes	Process descriptions (number)	C (& BU)
Documented information	Share of reports in databases per all reports (%)	C & BU
Efficient employee feedback system	Frequency of employee feedback (e.g. number / month)	C & BU
IT support of knowledge flow	Number of electronic discussion groups	C (& BU)
Quality assurance of processes	Audits and self-evaluation activities (number / year)	C (& BU)
Utilization of information technology	Annual investments in information technology (€)	C & BU

Some of the performance measures of intangible assets presented in the literature seem insufficiently defined. They lack some practical descriptions, e.g., regarding how the information should be collected for the measure. Commonly, it is suggested that employee

satisfaction should be measured using an employee satisfaction index (see e.g. Kaplan and Norton, 1996, pp. 70 - 71; Mouritsen et al., 2003a, p. 72). However, quite often there is little or no description of the way the index is calculated or the data collected.

There are some standard (at least almost standard) measures of intangible success factors. Such measures are typically related to human resource costing and accounting. For example, they include measures like the hours or money used annually for education per employee. These general measures focus on quite specific and defined aspects of an intangible asset. It seems that the more intangible a factor is the more likely it has to be tailored specifically according to the requirements of a particular measurement situation. Such issues include, e.g., employees' competencies and company image. They include situation-specific differences that affect the way the measurement is carried out. For example, when measuring employees' competencies, it should be decided which competencies and which employees the measurement concerns.

Many of the measures suggested in the literature are very indirect. For example, the percentage of employees with academic degrees is suggested to be a measure of the personnel's competence (Hannula et al., 2002, p. 131). However, that is probably not a very valid measure of the personnel's competence because there are so many other aspects of competence in addition to formal education, e.g. the type of education, other skills and so on. Thus, the relevance of such a measure for managers may not be very high. The problem might be remedied by using several indirect measures which might together provide valuable information on the factor. On the other hand, using several measures consumes more resources and interpreting results may be difficult.

Finally, some measures of intangible success factors in the literature seem useless in certain situations. First, some measures are useful only at company level, not in smaller business units. Such measures include, e.g., the percentage of employees with academic degrees and brand recognition based on a market survey. In smaller units, some issues may be self-evident without requiring any specific measurements. For example, there may not be any need to measure the percentage of employees with academic degrees if everybody knows that there are two persons with such degrees in some small organization. Second, certain measures seem to be somehow related to intangible assets but the actual relationship is not clear. This results in a situation where it is difficult to make any decisions based on the

measurement results. The number of managers and the number of female managers are examples of such measures (Edvinsson and Malone, 1997, p. 133). In Tampere University of Technology, there are no female professors at the Institute of Industrial Management while there are two female professors at the Institute of Business Information Management. This may reflect something about the intangible assets of the two institutes. However, it would seem that there are managerially more important issues than the gender of managers.

In conclusion, despite the problems regarding some of the measures of intangible success factors, there are also a lot of good measures already available in the literature. Using them often requires tailoring for the needs of a particular situation. Not all of the measures are useful in each situation. A suitable measure should be chosen to fit the needs of the particular situation.

4.2 Development of a performance measurement system

4.2.1 Phases of measurement

According to Neely et al. (2002, p. 33), the process of performance measurement includes four main phases. First, the design phase includes selecting the success factors and performance measures. Second, the planning and building phase consists of developing systems and practices for data collection, analysis and presentation of results. The third phase, implementing and operating the measurement system, consists of applying the measures in practice to manage performance. Finally, the measurement system must be refreshed, i.e. updated, by assessing the relevance of performance measures. In this phase, new measures may be identified and unnecessary measures deleted. Basically, the fourth phase closes the loop and the process starts from the beginning again.

The phases of performance measurement are quite commonly accepted. However, different terms are sometimes used to describe them. According to Bourne et al. (2000) and Leinonen (2001), choosing success factors and designing measures can be called designing the measurement system, and the phase of taking measures into use can be called implementation. Sometimes these two phases together are called building or constructing a measurement system (see e.g. Olve et al., 1999). Gooderham (2001, p. 29) uses the phrase

implementing performance measurement systems to refer to all phases of measurement. For Gooderham, implementation means applying, e.g., the Balanced Scorecard in practice.

In this research, the development of performance measurement is divided into three main phases: designing, implementing and using performance measures (see Figure 26). This division has recently been used by Franco and Bourne (2003a, p. 321) and Bourne (2003, p. 19). Neely et al. (2000, p. 1143) have also used the same division with the exception that they include maintaining, i.e. updating and refreshing, the measurement system as a fourth phase. It is considered here that the updating phase is an important part of an effective performance measurement. If measures are not updated often enough (e.g. when business objectives change), their relevance will likely decrease (see e.g. Kennerley and Neely, 2002). However, it can be considered that, in the updating phase, the cycle starts over from the beginning. Therefore, the updating phase includes many of the same phases as the designing phase. Furthermore, updating measures is excluded from the empirical examination of this study and, thus, it is not necessary to discuss it in this context.

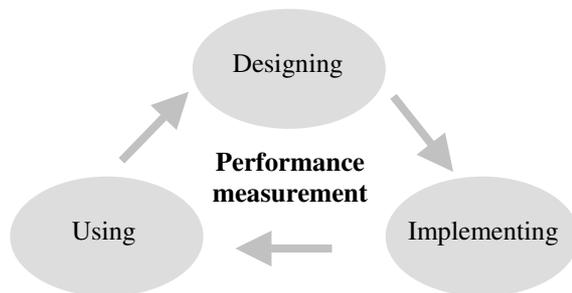


Figure 26. Main phases of performance measurement.

The phases of measurement are obviously quite different. One difference suggested by Bourne (2003, pp. 18 - 19) is related to the time and effort required of managers in various phases. This is illustrated in Figure 27. The design phase is usually carried out using workshops that are lead by a facilitator or a consultant. Managers and other people participating in the workshops must work hard while in them, but there is not a lot of work required between the meetings. The workload of managers increases in the implementation phase because managers must themselves carry out activities that were planned in the design phase. In the implementation phase, the workload required of them approaches the 'limit of effort', i.e. the maximum amount of effort available. The limit exists because managers have only a limited amount of time and other resources available. After the measures have been

implemented, the workload decreases. In the using phase, managers use their time and energy for reviewing results and maintaining the measurement system.

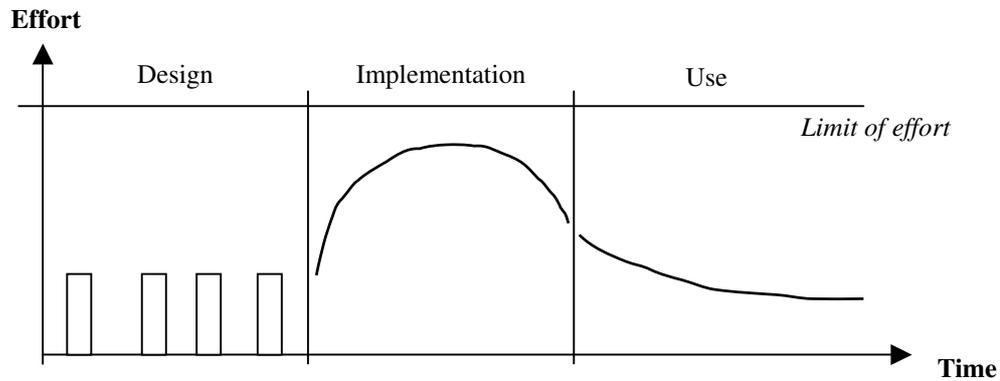


Figure 27. Managerial effort required in different phases of performance measurement. (Bourne 2003, p. 19)

Franco and Bourne (2003a, p. 317) have presented yet another way of considering the different phases of measurement (see Figure 28). According to the model, the use of a performance measurement system is affected by process factors, i.e. the quality of the design and implementation of the measurement system, and by internal and external contextual factors such as firm strategy and culture. In turn, the use of the measurement system impacts the outcomes and the results of the organization. Therefore, successful design and implementation are the prerequisites for achieving something using performance measurement.

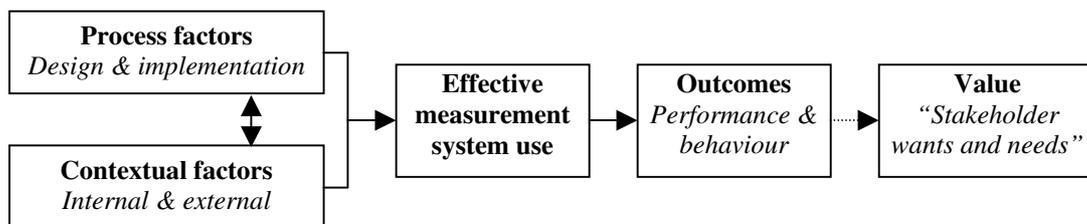


Figure 28. Managing through measures. (Franco and Bourne, 2003a, p. 317)

Most of the literature regarding designing and implementing deals with *measurement systems*. In this study, the main interest is on how to design, implement and use specific (single) measures of intangible success factors. However, most of the issues in designing, implementing and using are the same in the case of one measure or a group of measures, i.e. a measurement system. In addition, also the measures of intangible success factors are likely to be used as part of a measurement system. Thus, the findings made in earlier research are valuable also when considering the objectives of this study.

Stivers et al. (1998) have discovered an interesting phenomenon related to the phases of measurement. They studied how top executives in the United States and Canada use non-financial performance measures and found out that there are certain gaps between the phases of measurement. First, there is an importance-measurement gap. This means that even though managers view certain non-financial factors as important, they are not able to measure them. The importance-measurement gap is greatest for certain intangible success factors, e.g., morale and corporate culture and core competencies. Second, there is a measurement-use gap. This occurs when companies measure factors that they have identified as important but do not use the measurement results. For example, 197 (83.8 %) out of 235 respondents indicated that they measured ‘delivery performance / customer service’, but only 140 (71.1 %) out of the 197 were using the measurement information for planning purposes. Also the measurement-use gap is greatest for certain intangible success factors, e.g., employee satisfaction, employee turnover and internal recognition. Figure 29 illustrates the importance-measurement and the measurement-use gaps.

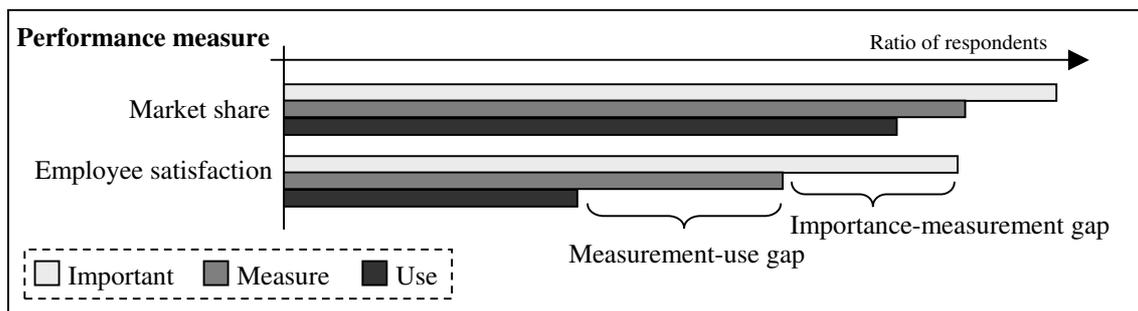


Figure 29. The importance-measurement gap and the measurement-use gap. (Based on Stivers et al., 1998, p. 46.)

In the following chapters, the phases of measurement are discussed more thoroughly. Before discussing the individual phases in detail, process models for designing and implementing performance measurement systems are first presented. The processes often include issues related to all phases of measurement. Therefore, it is more practical to present them as a whole, instead of dividing them into pieces according to the phase of measurement. In fact, as Bourne et al. (2000, p. 758) have noted, the three-phase-split is conceptual and the phases are overlapping in practice. For example, Kaydos (1999, p. 192) suggests that a performance measurement system cannot be, in a straightforward way, first designed, then implemented and finally used; measures must first be used in order to see their weak areas and then refine, i.e. redesign and implement, them.

4.2.2 Process models for designing and implementing measures

There are several models available for designing and implementing performance measurement systems (e.g. by Institute of Management Accountants, 1998; Kaplan and Norton, 1996; Leinonen, 2001; Macbryde and Mendibil, 2003, pp. 128 - 129; Neely et al., 2000; Olve et al., 1999; Tenhunen et al., 2001; Toivanen, 2001). The idea of using a structured performance measurement design process is that it helps overcome possible problems in the implementation phase (Bourne et al., 2002, p. 1307). Some researchers have assessed the characteristics of different models. Leinonen (in Hannula et al., 2002, p. 150) has stated that most models have two similar features. First, they proceed in a similar way, starting from identifying strategic objectives and ending up with defining performance measures. However, the phases in between are different and the number of phases varies. Second, many of the models focus on designing the measurement system and pay less attention to the implementation of the measures. Actually, Leinonen describes only certain types of processes, i.e., those designed for the balanced-scorecard-type performance measurement systems.

Bourne et al. (2003, pp. 6 - 7) have examined eleven models for designing performance measurement systems. They categorize the different processes according to 1) the procedure and 2) the approach used. Different procedures include the 'needs-led', the 'audit-led' and the 'model-led' procedures. The needs-led procedure is a top down process which starts from the stakeholders' needs. Needs-led processes include the process models for implementing the Balanced Scorecard (see e.g. Toivanen, 2001). The audit-led procedure is based on analysing the existing measurement system. An example of such an approach is the Performance Measurement Questionnaire (see e.g. McMann and Nanni, 1994). The model-led procedure is based on a prescriptive theoretical model of the organization as a rationale for designing performance measures. According to Bourne et al. (2003, p. 6), such models include the ECOGRAI and the Fraunhofer. The second category suggested by Bourne et al. divides the processes into consultant-led and facilitator-led approaches. In the first case, a consultant (or several consultants) carries out the process with only small involvement by the managers. In the latter case, a group of managers carries out the process.

The process is facilitated, i.e. a person called the facilitator guides the discussions in the workshops but the managers themselves actively participate in designing the measures.

The designing and implementing of the Balanced Scorecard has been studied a lot. In addition to Kaplan and Norton (1996), also other systematic processes for implementing the Balanced Scorecard in an organization have been developed (see e.g. Olve et al., 1999, pp. 37 - 83; Toivanen, 2001). According to Toivanen (2001, p. 121), the following phases should be included in the process of implementing a Balanced Scorecard performance measurement system:

- Make a clear decision regarding starting a Balanced Scorecard construction project.
- Ascertain management's commitment to the project.
- Clarify the organization's vision and strategy.
- Define the critical success factors.
- Set goals and choose performance measures.
- Obtain the organization's commitment to the new measurement system.
- Finalize the measurement system (supplement measures / delete less important measures).
- Implement the measurement system in lower organizational levels.
- Design action plans for reaching the goals.
- Apply continuous improvement to further develop the measurement system.

Leinonen (2001, p. 4) has presented a more detailed description of designing and implementing the Balanced Scorecard. His list of design phases has been constructed based on the process models of Olve et al. (1999), Kaplan and Norton (1996), and the Institute of Management Accountants (1998). The phases of designing a Balanced Scorecard include the following steps:

- Define the environment, describe the position, the roles and the future trends.
- Create the steering and project teams.
- Ensure top management support.
- Confirm the vision.
- Establish the perspectives.
- Define the strategic objectives.
- Check for any suboptimisation at the expense of other strategic business units.
- Define and prioritise the critical success factors.

- Identify the cause-effect relations and check for any overlapping or gaps between the critical success factors.
- Define the measures for critical success factors.
- Create and approve the top management scorecard.
- Derive the subunit scorecards from the top-level scorecard.
- Link the measures horizontally and vertically.
- Define data sources for the measures.
- Define targets for measures and check for any conflicting targets.
- Inform the organization about the progress of the project.
- Ensure balance, define priorities, and check for conflicts between different measures.
- Document the measurement system.
- Develop and improve information systems and connect the performance measurement system to it.
- Train the users.
- Develop the implementation plan.
- Define responsibilities in measurement.
- Implement the system for ongoing use.
- Inform the organization.

Neely et al. (1996) have created and tested a process model for designing a performance measurement system. Their model is limited to designing, i.e. implementation is excluded. Their model is presented in Figure 30. The left-hand side of the figure deals with top-level measurement and the right-hand side deals with cascading the measures through the organization. The authors do not explain the meanings of the arrows. The two arrows that originate from '2. Agreeing business objectives' seem to visualize the need to derive top-level measures and lower-level performance drivers from business objectives. The arrow originating from the end of top-level and lower-level processes is likely to imply the comparison of the finished measures with business objectives.

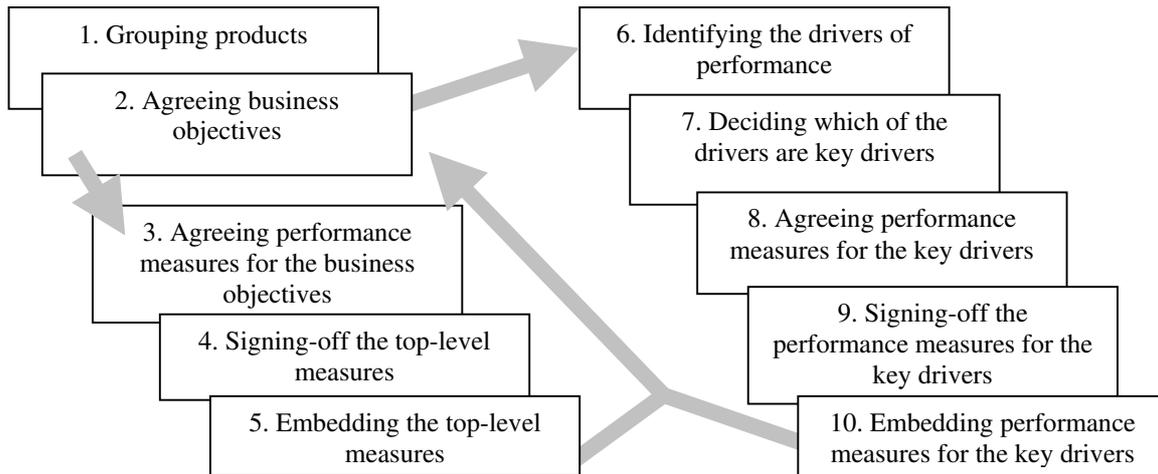


Figure 30. Process for designing a performance measurement system. (Neely et al., 1996, p. 41)

Tenhunen et al. (2001, p. 359) have developed a process model for implementing a performance measurement system in small and medium-sized companies. They state that since a small company is often a simple system, the performance measurement system should also be simple. In addition, because of the limited resources, the designing and implementing of the measurement system should be uncomplicated. The suggested process model consist of the following phases:

1. Cause and need

- impulse – recognizing the need for a performance measurement system
- definition of the main purpose or usage of the performance measurement system (e.g. guidance, planning, control, informing, motivation)

2. Committing the participants

- participant selection for the design team (determined by the main purpose of the performance measurement system)
- committing the participants to the implementation process (the commitment of the owner/manager is assumed)
- informing the personnel affected by the performance measurement system (in day-to-day work)

3. Determinants

- definition or clarification of corporate vision and strategy
- definition or clarification of corporate goals, objectives, critical success factors and vital activities
- beginning in reverse order with the vital activities may clarify the corporate strategy (a possibility if the corporate strategy is not well defined)

4. Construction

- selection of relevant performance dimensions to measure (3 to 6 are enough)
- selection of relevant measures (cost-benefit analysis and usability are essential)
- there should not be too many measures (the total number of measures in small and medium-sized companies can be 5 - 25)
- finishing up the system and ascertaining the validity of the designed system

5. Use and development

- trial run and informing a specified group of personnel about the system
- revising the system after the trial run
- integrating the designed performance measurement system into the corporate management
- observing the validity of the system and detecting possibilities to improve the performance measurement system in use

In addition to the four models presented here, also other models can be found in the literature. The properties of the process models are not evaluated here. However, one issue is pointed out. The phases in the models include both technical and organizational issues. Technical issues include, e.g., clarifying an organization's vision and strategy, defining the strategic objectives, defining and prioritising the critical success factors, defining the measures for critical success factors, documenting the measurement system, developing the implementation plan, developing and improving information systems and connecting the performance measurement system to it. In addition to the technical issues, supportive organizational tasks are carried out. They include, e.g., making a clear decision regarding starting a Balanced Scorecard construction project, ensuring top management support and obtaining the organization's commitment to the new measurement system. These organizational issues appear to be similar to those in other types of organizational change projects (see e.g. Salminen, 2000, p. 150).

This research is focused on the technical issues of the design and implementation process as described in Salminen's (2000) framework. This is because the research is focused on the specific characteristics of the measures of intangible success factors, i.e. only a part of a measurement system. It is assumed here that the organizational issues in the design and implementation process are similar to those in the case of other types of measures. The following chapters examine the phases of measurement more thoroughly.

4.2.3 Designing measures

The design phase can be divided into identifying the factors to be measured and designing the measures themselves (Bourne et al., 2000, p. 757). For the sake of clarity, here the designing of individual measures is called defining measures (see e.g. Neely et al., 2002, p. 33). This is illustrated in the figure below.

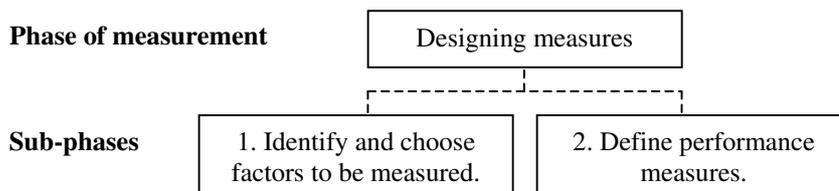


Figure 31. Sub-phases of the design phase of performance measurement.

The starting point of the design phase is the purpose for measuring performance. The purpose for measuring performance may include controlling, motivating, guiding and benchmarking. (Tenhunen et al., 2001, p. 359) The factors that are measured as well as the performance measures may differ, depending on the purpose of measurement. For example, guiding employees to focus their efforts on strategically important matters often requires that organization-specific factors should be measured. However, when benchmarking against best practices, the factors measured must be common to other organizations also.

Critical success factors, or key success factors, are related to business objectives where good performance must be achieved (see e.g. Kaydos, 1999, p. 69). Often performance measurement focuses on these issues. Thus, choosing what to measure requires prioritising between what is necessary and what is only desirable. In the context of a balanced performance measurement system, critical success factors are identified based on the organization's vision and strategy (Kaplan and Norton, 1996) or based on the needs of various stakeholders (Neely et al., 2002). The performance measurement frameworks, e.g. the Balanced Scorecard and the Performance Measurement Prism, can be used as tools in identifying and deciding which factors are critical, i.e. which factors should be measured. One or more success factors should be identified from all the measurement perspectives (see e.g. Hannula et al., 2002, p. 160), which include the financial perspective, the customer perspective and so on. Malmi et al. (2002, p. 64) have identified two methods for choosing success factors in the context of the Balanced Scorecard. First, it can be done directly based on the strategy and by following the cause-effect chain between success factors. The second

way is to first choose the measurement perspectives and then choose critical success factors for each perspective.

In choosing what to measure, the relationships with other factors should be taken into account. It may not be cost-effective to measure many closely related or overlapping factors. On the other hand, it may be desirable to ascertain that the factors measured are somehow linked to each other and that no perspective of performance is neglected. A practical tool in visualising the relationships between success factors is the strategy map or a success map (Franco and Bourne, 2003a, p. 318; Kaplan and Norton, 2001; Neely et al., 2002, p. 164). The idea of the strategy map is based on the assumption that there are causal relationships between success factors (Gooderham, 2001, p. 33; Kaplan and Norton, 2001, pp. 69 - 72; Kaydos, 1999, p. 73; Neely et al., 2002, pp. 164 - 165; Uusi-Rauva, 1996a, p. 24). For example, a typical business objective of a company could be to achieve a certain level of profitability. It could be assumed that the causing factors of profitability include productivity and quality of operations (see e.g. Uusi-Rauva, 1996a, p. 24). It is possible to measure both the objectives and the causes, which are sometimes called drivers (see e.g. MacBryde and Mendibil, 2003, p. 128). Performance drivers may also include managerial actions or initiatives that are carried out to achieve an objective. For example, decreasing costs or increasing sales can be used as a means for improving profitability.

Performance measurement is a versatile management tool. Thus, balanced performance measurement is just one possibility. Organizations may decide to measure some individual factors just because they are experienced as important. They do not necessarily have to adopt a balanced performance measurement system. In 'Management by objectives', performance measures are chosen so that they provide information needed to achieve objectives and on how the targets are reached (see e.g. Stockton, 1987, p. 134). Uusi-Rauva (1996a, p. 31) has presented a simple framework for identifying the goals of a person or an organizational unit (see Figure 32). According to the framework, examining the requirements set by other actors in the organization can help identify goals of an individual in an organization.

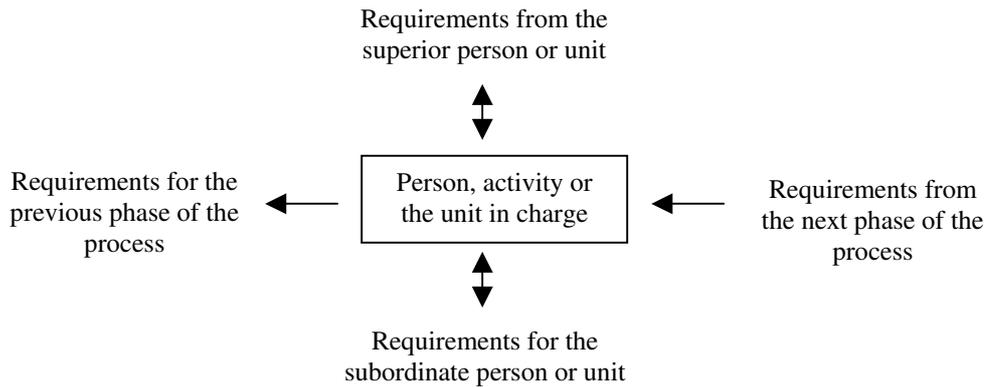


Figure 32. Identifying the goals of a person or an organizational unit. (Uusi-Rauva, 1996a, p. 31)

Once a success factor has been identified for measuring, a performance measure can be defined. In practice, the definition of performance measures starts with thinking up various ways for measuring a factor. Brainstorming, for example, can be used to create ideas. Later the best idea or ideas are chosen. (Hannula et al., 2002, p. 163) The literature suggests many criteria for choosing the best performance measure for a particular situation. First, the criteria of sound measurement should be met (see Chapter 4.1.1). Second, the performance measure needs to show how close one is from the target and how quickly one is moving towards the target (Neely et al., 1996, p. 64). Third, performance measures should stimulate appropriate behaviour and managerial action (ibid.). These criteria may not be easily met in practice. If they cannot be met, it may still be worth using even a crude or deficient measure. This may provide valuable information regarding a critical success factor that would not otherwise be available at all (Hannula et al., 2002, p. 164; Stivers et al., 1998, p. 48).

The definition of a performance measure consists of determining various practical aspects related to it. These issues include the title of the measure, the purpose of using the measure, how the result is calculated, who is responsible for achieving the goal, who is responsible for calculating the measurement result, how often the measurement is carried out, how the results are reported, how often and where the results are reviewed, what the source of the data is, what the target value is and who sets the target (Hannula, 2000, p. 48, Neely et al., 1996, p. 64; Neely et al., 1997, p. 1151; Uusi-Rauva, 1996b, p. 76). After these issues have been decided, they can be documented on a performance measure record sheet (Neely et al.,

1996, p. 64). The following table provides an example of a performance measure record sheet.

Table 14. Example of a performance measure record sheet. (Based on Neely et al., 1996, pp. 64 - 66.)

Aspect	Explanation	Example
1. Title	The name of the measure. A good name explains the purpose of the measure.	Delivery performance
2. Purpose	A measure without a purpose is not worth measuring.	To stimulate improvements in delivery reliability
3. Relates to	Identifies the business objectives to which the measure is related.	Business implications; delivery on time and minimisation of overall lead times
4. Target	The level of performance to achieve and the time by which it should be achieved.	90 percent by the end of next year
5. Formula	How is the result calculated?	Percentage of orders delivered in full on the day they were promised
6. Frequency	How often is the result calculated and reported?	Weekly
7. Who measures?	Name the person(s) who is / are responsible for collecting the data, calculating and reporting the result.	N.N., production control
8. Source of data	Where is the data obtained?	Due dates: as stated on customer schedule; actual delivery: by phoning the customer
9. Who acts on data?	Name the person or a group who is responsible for making actions based on the results.	M.M., manufacturing manager
10. What do they do?	Describe activities for correcting poor performance. These vary according to situation.	If performance is improving rapidly enough, nothing. If not, set up manufacturing task force to investigate why and make appropriate changes
11. Notes and comments	The specific characteristics and problems related to the measure.	Measure places equal weighting on early as well as late delivery

The design of performance measures sets the foundation for implementation and eventually for using the measures. Thus, any problems occurring in the design phase may lead to more problems in the following phases. Leinonen (2001, p. 12) has identified some challenges experienced by managers in designing performance measurement systems. First, data integration seems to cause most problems when designing a performance measurement system. The second problem is the difficulty in detecting and creating the linkages between measures and balancing the measures. Bourne et al. (2003, p. 19) have, based on earlier literature, listed problems that may cause difficulties in the design of performance

measurement systems. They include difficulties in evaluating the relative importance of measures and the problem of identifying the ‘true’ drivers, time and expense required, the need to quantify results in areas that are more qualitative in nature and striving for perfection.

The Institute of Management Accountants (1998, p. 49) suggests that, in successful design of performance measurement systems, front-line employees should participate in defining performance measures; measures developed should be concise, intuitively obvious and focused on strategic goals; all measures should be defined so that they together guide towards the achievement of strategic goals; all measures should be such that they can be influenced by the actions of the person or group whose performance they are measuring. An important factor affecting the success of the design process is the effort of the facilitator (Bourne et al., 2002, p. 1303).

The designing of intangible success factors has been considered difficult (Dion, 2000; Neely et al., 2002; Nordika, 2000). The biggest problem seems to be the difficulty of finding or designing measures of some specific factors, e.g. brand effectiveness, competencies or innovation (Lönqvist, 2002; Neely et al., 2002, p. 18). The intangible nature of the factors being measured makes them difficult to measure (Lönqvist and Mettänen, 2002). Currently, the specific issues considered as problematic in designing the measures of intangible success factors are mainly unknown. In Chapter 1.2.2, it was suggested that the problem of finding concrete measures is caused by two things. First, the intangible success factors are too ambiguous to measure. It is difficult to define a measure for an intangible success factor if it is uncertain what should be measured. Second, information systems do not support the measurement of intangible success factors. In comparison, the systems for, e.g., production management and bookkeeping provide the basis for designing measures of many tangible, i.e. the traditional financial and non-financial, success factors.

After the design phase, the performance measures should be finished “on paper”. This means that the measures are carefully planned on, e.g., a paper or a spreadsheet but they are not yet in action. The next phase is implementing the measures in practice. This is examined in the next chapter.

4.2.4 *Implementing measures*

“(I)mplementation is defined as the phase in which systems and procedures are put in place to collect and process the data that enable the measurements to be made regularly” (Bourne et al., 2000, p. 758).

According to Leinonen (in Hannula et al., 2002, p. 151), the implementation of performance measures includes the following phases. First, procedures must be created for everyday measurement. Second, systems must be created and implemented for collecting, handling and reporting information. According to Bourne et al. (2000, p. 758), this phase may include computer programming to trap data already being used in the system and present them in a more meaningful form, initiating new procedures, so that information currently not recorded is captured, and creating completely new initiatives, such as the setting up of a regular customer or employee survey. Finally, the organization’s personnel must accept the new measurement system and start using it in everyday operations.

According to Malmi et al. (2002, p. 112), the implementation of a performance measurement system includes two main tasks: operational and technical implementation. The operational implementation includes informing personnel about the performance measurement project and the strategy of the organization, educating them about using performance measurement and finally test-using the measurement system in practice. Malmi et al. (2002, p. 114) consider the technical implementation mainly as creating the computerized performance measurement tool. However, a precondition for creating the computerized measurement tool is to determine the other technical aspects as described by Bourne et al. and Leinonen.

Hacker and Brotherton (1998) suggest three guidelines for successful implementation of a performance measurement system. First, personnel must be required to use the measurement system. Managers can support this by showing their commitment to the management tool by scheduling performance review meetings at which the measurement results are examined. Second, issues related to data availability or integrity should not delay the implementation. If data is not available for certain measures, managers should find alternative ways for accessing the data or identify other types or sources of data. Third, the reporting and standardization of the results should be made using standard formats. Varying, e.g., the chart types when presenting the data may waste time because it is spent in trying to

understand the content in new formats and in doing the varying itself. The Institute of Management Accountants (1998, p. 49) has also listed the success factors of implementing a performance measurement system. They are presented in Table 15 along with the pitfalls of implementing.

Table 15. Critical success factors and pitfalls of implementing a performance measurement system. (Institute of Management Accountants, 1998, p. 49)

Critical success factors (“Do’s”)	Pitfalls (“Don’ts”)
Recruit a dedicated, senior executive to ensure top management participation.	Don’t begin a project without senior management commitment.
Throw out old measures that are not necessary to the overall functioning of the business.	Don’t retain old measures that confuse or don’t add value.
Include key performance indicators (KPIs) as part of the new evaluation and compensation system.	Don’t continue to evaluate and compensate personnel on obsolete performance goals.
Invite front-line employees to help define KPIs, and encourage use of KPIs as self-measurement and self-education tools, so there are no surprises at evaluation time.	Don’t use KPIs as a weapon against personnel.
Develop concise, intuitively obvious KPIs focused on strategic goals.	Don’t design too many, or too complex, KPIs – this may confuse employees.
Keep the big picture in mind when defining KPIs – all KPIs should work together to achieve strategic goals.	Don’t define KPIs too narrowly – this may encourage suboptimisation of specific segments.
Make sure that all KPIs can be influenced by the actions of the person or group whose performance they are measuring.	Don’t design KPIs for areas that are not controllable by employees.
Pay attention to the cultural change caused by the new system. Keep communication open and train / educate employees to make the best use of the system.	Don’t implement a new performance management system without addressing change management issues.

Bourne et al. (2002, p. 762) have identified the following challenges in the implementation of performance measures:

- resistance to measurement, occurring during design and use phases;
- computer systems issues, occurring during implementation of the measures; and
- top management commitment being distracted, occurring between the design and implementation phases.

Hacker and Brotherton (1998) mention the lack of leadership and the resistance to measurement due to fear of measurement as the greatest problems in measurement. Bourne et al. (2003, p. 19) suggest that implementation is experienced as difficult if measures are too poorly defined, it takes a lot of time and money and there is a need for a highly developed information system. Also Leinonen (2001, p. 13) has identified that the lack of resources causes problems in implementing performance measures. One additional problem that has not yet been mentioned is disturbing actions by the parent company (Hannula et al.,

2002, p. 175). The parent company may, e.g., demand certain issues to be reported by all business units, change organizational structure or start new projects which may lead to giving a lower priority to the measurement project.

According to Bourne et al. (2002, p. 767), implementation is primarily a mechanistic exercise and should be managed by classic project management tools. Leinonen (2001, p. 13) has found some evidence from a survey suggesting that the use of change management approaches supports the implementation of a performance measurement system.

It seems likely that the problems of implementing the measures of intangible success factors might be similar to implementing any other performance measures. The findings by Bourne et al. (2002, p. 767) and Leinonen (2001, p. 13) described above support this assumption if it is considered that the mechanical tasks during the implementation phase are similar regardless of the type of factors measured or the measures designed. However, there is currently a lack of knowledge regarding the specific problems of implementing the measures of intangible success factors. For example, the suggested lack of information systems, which provide the measurement data, may mean that new systems must be created. This may result in an increased amount of work during the implementation phase.

After a successful implementation phase, performance measures are ready for use. This means that information systems provide the necessary data and procedures such as reviewing meetings and reporting policies are in place for using the measures. The using phase is examined in the following chapter.

4.2.5 Using measures

Performance measurement is a versatile tool that can serve the entire management process of an organization (see e.g. Andersin et al., 1994, p. 7). According to Simons (2000, p. 67), performance measurement can be used for the following purposes: decision-making, control, guidance, education and learning and external communication. Also other authors have presented similar listings (see e.g. Lönnqvist, 2002, p. 38; Neely, 1998a, p. 71; Uusi-Rauva, 1996a, p. 11).

A typical way of using performance measurement is to control how targets are being achieved. If a target is not achieved, corrective actions can be taken. This is called single-loop learning (Argyris and Schön, 1996; Kaplan and Norton, 1996, p. 268). Another typical use of performance measurement is to guide employees. Measuring focuses personnel's attention on the issues that are measured (see e.g. Neely, 1998b, p. 54; Uusi-Rauva, 1996a). Thus, if performance measures are derived from the strategy, measures can be used in translating the strategy into concrete objectives (Kaplan and Norton, 1996, p. 10). Double-loop learning occurs when measurement is used to challenge the assumed relationships between success factors, i.e. the strategy (Argyris and Schön, 1996; Bourne et al., 2000, p. 761; Kaplan and Norton, 1996, pp. 267 - 269). Finally, performance measurement can be used to motivate employees (Neely, 1998b, p. 54; Simons, 2000, p. 69).

Based on the previous descriptions, performance measurement can be used in two main ways: first, to examine the measurement results and, second, to assign a measure for a certain factor to focus attention on it. Bourne et al. (2000, p. 761) divide the purposes differently, based on how performance measurement is used in relation to strategy: measures can be used to assess the implementation of the strategy or to challenge strategic assumptions. Lönnqvist (2002, p. 49) has connected the ways of using measures to the basic strategy processes. In Figure 33, the large arrows represent the main direction of the process. The smaller arrows show that information also flows in the opposite direction. It can be considered that performance measurement has a supportive role in the strategy process. Therefore, performance measurement can be seen to be used between the phases.

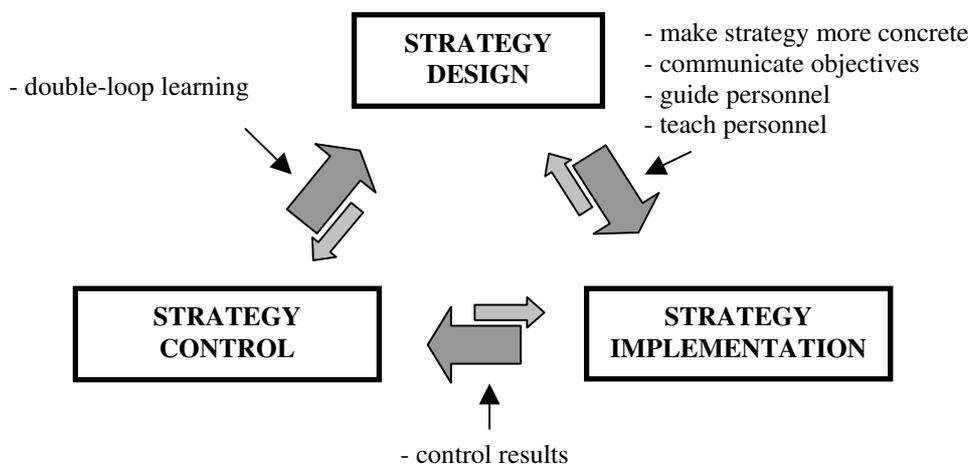


Figure 33. Use of performance measurement in different phases of the strategy process. (Lönnqvist, 2002, p. 49)

So far, this chapter has discussed the possibilities and the positive aspects of performance measurement. However, using performance measurement may not be easy in practice. First, merely measuring does not fix problems related to performance. It is necessary to form conclusions and decisions based on the measurement results. Performance paradox is a phenomenon in which management is aware of the problems but has not engaged in any activities in order to fix them (Cohen, 1998).

Lönnqvist (2002, p. 57) has identified six interrelated types of factors that may hamper the use of performance measurement:

- General measurement-theoretical problems
- Current performance measures and measurement systems
- Definitions of the performance measures
- Nature of business and operating environment
- Information systems
- Organizational culture

These different types of problems are discussed below. It should be noticed that some of them consist of several problems.

The **general measurement-theoretical problems** include the criteria of sound performance measures, e.g. validity and reliability. In addition, the problems of accounting are included. They are the following (Neilimo and Uusi-Rauva, 1997, pp. 38 - 41):

1. The problem of scope: which profits and costs are included in calculations?
2. The valuation problem: which values are used (e.g. original cost or market value)?
3. The assignment problem consists of two sub problems:
 - a. The allocation problem: how are profits and costs allocated to different activities, products or services?
 - b. The accrual problem: how are profits and costs allocated to different periods?
4. The measurement problem: how accurate and reliable is the accounting of monetary information and resource utilization?

According to Neilimo and Uusi-Rauva (1997, p. 38), it is important to know how the accounting problems are solved when trying to interpret different measures. The second source of problems in using performance measurement is related to the shortcomings in the **current performance measures and measurement systems** of the organization. For

example, the measurement system may have too many measures, too few measures or wrong measures, and it may be difficult to interpret the measurement results (Lönqvist, 2002, p. 61; Neely, 1998a, p. 42).

The **detailed definitions of performance measures**, i.e. the contents of the performance measurement record sheet, are usually determined specifically in each measurement situation. Thus, the related problems are also organization-specific. However, two main types can be pointed out. First, performance measures may be falsely defined so that they do not serve the original purpose of the measure. Second, performance measures may be insufficiently defined. This may cause confusion regarding the use of measurement. (Lönqvist, 2002, p. 62) The fourth type of possible problems arises from the **nature of business and operating environment**. For example, a company may operate in a very dynamic environment where business objectives can change rapidly. Thus, performance measures will lose their relevance or, in the worst case, start guiding personnel's actions in the wrong direction unless they are continuously updated (see e.g. Kaplan and Norton, 2001, p. 303).

The fifth case causing problems is related to the **information systems** of the organization. The performance measurement system is often connected to the information systems of the organization. Thus, the properties of the information system limit the way performance measurement is carried out. Information systems may not include all the necessary information needed in performance measurement. It is also possible to collect the necessary information manually. However, that may take too many resources. This may lead to the situation in which some important factors are not measured because information systems do not support the measurement. (Lönqvist, 2002, p. 63) On the other hand, sometimes factors that are only of secondary importance are measured because the information needed can easily be obtained from the information systems (see e.g. Neely, 1998a, pp. 41 - 42).

The sixth factor affecting the use of performance measurement is the **organizational culture**. For example, sharing measurement information with all employees is an issue that may be problematic in some organizations. Furthermore, without management's support and encouragement, employees may not find performance measurement an important issue (Lönqvist, 2002, p. 64). According to Hofrichter (1999), the wrong kind of performance

measures in a certain organizational culture can cause confusion and paralyse the organization.

The above-mentioned issues may cause various challenges and problems in the use of performance measurement. They may show up, e.g., as problems in using performance measurement for certain purposes. In a recent survey regarding how Finnish managers use performance measurement, the managers had the greatest problems with the following purposes of use: 1) managing employees' competencies and knowledge capital, 2) forecasting future situations, 3) applying double-loop learning, 4) teaching personnel the relationships between success factors, 5) transforming the strategy into concrete objectives and 6) controlling the implementation of the strategy (Lönnqvist, 2002, p. 118). Many of the effects of measurement presented earlier as positive may in some situations occur as negative. When performance measurement fails, it may emphasize wrong things and thus lead personnel in the wrong direction, irritate the persons being measured, decrease motivation, cause a negative competitive situation and reward for wrong results (Lönnqvist, 2002, p. 35, 42).

The possible problems and negative issues related to the use of performance measurement emphasize the importance of a successful design and implementation phase. If the design and implementation phases fail, there are not good opportunities for using performance measurement. On the other hand, when they are carried out successfully, performance measurement may be used in several ways, depending on the needs of the management.

So far, the research on the measurement of intangible success factors has mainly focused on designing the measures. This is understandable since there are problems in designing useful measures of intangible success factors. However, this has resulted in the current situation in which there is a lack of knowledge regarding how the measures of intangible success factors are used and the problems that may be experienced in using the measures. It is possible that using the measures of intangible success factors could differ somehow from the way in which measures of tangible success factors are used or that there could be some specific problems. For example, it may be difficult to use the measures of intangible success factors if there are problems with, e.g., the validity or reliability of the measures as suggested earlier.

4.3 Summary

This chapter has presented comprehensively various issues that are related to measuring individual success factors. First, there are many ways to measure, e.g., directly, indirectly, objectively and subjectively. Second, the soundness of a performance measure is affected by the properties of the success factor (relevance and measurability), the measurement situation (purpose of using the measure, resources and other measures in use) and the general properties of measures (validity, reliability, relevance and practicality). Third, there are many measures of intangible success factors available in the literature. Some of them seem applicable while some appear problematic, e.g., because measures may lack adequate definition or they may be very indirect.

The different phases of measurement and the problems related to them have also been discussed. The first phase is designing, which consists of choosing what to measure and then defining performance measures. The specific problems in designing performance measures of intangible success factors are related to the immaterial nature of the factors and the lack of information systems that would provide the data needed. However, there is still a lack of knowledge regarding the specific characteristics of designing the measures of intangible success factors. The second phase is implementation, which consists of activities related to putting the measures into practice, e.g., developing information systems. The specific characteristics and challenges related to implementing the measures of intangible success factors are still mainly unknown. After implementation the measures can be used, e.g., in guiding activities and checking that the targets are being reached. Also in the using phase, the specific characteristics and challenges related to the measures of intangible success factors are still mainly unknown.

The discussion regarding the specific issues related to measuring intangible success factors has thus far been quite limited. This is due to the fact that literature on this particular topic is quite scarce. In the following chapter, the issues discussed in this and the previous chapter will be combined and examined especially from the point of view of measuring intangible success factors.

5 PRESENT STATE OF RESEARCH AND KNOWLEDGE ON THE MEASUREMENT OF INTANGIBLE SUCCESS FACTORS

This chapter begins by reviewing recent studies related to the measurement of intangible success factors. After that the current knowledge on the measurement of intangible success factors is presented. The presentation is based on the author's conclusions gained from a study of the earlier literature and also on his further analysis of that literature as well as of the research on the subject that has been discussed in Chapters 3 and 4. In Chapter 5.2.1, an attempt is made to integrate the properties of various measurement approaches regarding the process of designing the measures of intangible success factors. Finally, the open questions in the doctrine are discussed and possible research methods for answering them are suggested. This part of the chapter provides a justification for the way in which the forthcoming empirical examination is carried out.

5.1 Review of research

5.1.1 Recent studies on the measurement of intangible success factors

The research on the measurement of intangible success factors has been very active since the late 1990s when many of the first classics in the field were published. This chapter includes a review of the research work that has been carried out since. The focus is on both what has been studied, i.e. the research topic, and how it has been studied, i.e. the research methodology. First, some large research projects are described. Then, the focus will shift to single studies. Because of the large volume of research, a comprehensive review is difficult to present. Therefore, this review of research focuses only on the most relevant studies from the point of view of this study. Nevertheless, the aim is to provide an accurate picture of the activities in the research field.

The MERITUM (Measuring intangibles to understand and improve innovation management) project was participated in by researchers and research institutes from six European countries. It was carried out during 1998 and 2001. The project was quite large and included several objectives, e.g. to analyse management control of intangible assets and to assess the importance of intangible assets for a company's value on the stock market.

(Meritum, 2001a) As part of the project, an exploratory study of measuring and managing intangible assets in eleven Swedish companies has been carried out (Johanson et al., 2001). The study was based on interviews in companies that had been identified as advanced practitioners of measuring and managing intangible assets. The study covered many issues related to the measurement and management of intangible assets. The questions in the interviews included, e.g., the following: What is measured? How is it measured? Some of the key results of the study are listed below:

- Intangible success factors are measured in a large number of ways.
- Such factors are measured which are considered crucial for obtaining results.
- The factors being measured will change because of learning; new discoveries make earlier measures inadequate.
- Data collection for the measurements is carried out, e.g., using telephone interviews or questionnaires. Some companies use consultants while others collect the data by themselves.
- The measurement system also includes, in addition to measures and objectives, certain processes in which results are communicated and action is encouraged based on the measurement results.
- The benefits of the measurement of intangible success factors include, e.g., learning from the results and gaining a quantitative basis for argumentation. (Johanson et al., 2001)

As a result of the project, a handbook on the measurement and reporting of intangible assets was published. The substance of the book was created using the Delphi method, which is a qualitative research method. The aim of the method is to gain a common view among a group of experts without personal meetings. This is achieved using survey questionnaires that are sent repeatedly. (Meritum, 2001a) Based on the results of the MERITUM project, a new project called E*KNOW-NET (A European Research Arena on Intangibles) has been established. The goals of the project are to advance the research field and assist businesses in managing their intangible assets. A virtual network consisting of researchers, practitioners, authorities and investment analysts etc. is constructed in the project. It is expected that the cooperation between network members will result in achieving the goals. (E*KNOW-NET, 2003)

The Danish Agency for Trade and Industry (2000) also carried out a research project that resulted in a report: A Guideline for Intellectual Capital Statements (see Chapter 3.2.2.5). The project was carried out during 1998 and 2000. In the project, 17 Danish companies prepared two sets of intellectual capital statements. The research methods included

interviews, observation of meetings and questionnaire surveys (Bukh et al., 2001, p. 93). The authors consider that certain parts of the study can be considered as action research because the researchers offered the case companies feedback and participated in meetings. The Guidelines were developed based on studying the processes of preparing the intellectual capital statements. Since the research report was published, the Guidelines have been applied in around one hundred companies (Danish Ministry of Science, Technology and Innovation, 2002). Just recently, the same research group published an updated version of the Guidelines (Mouritsen et al., 2003a). The new Guidelines are based on the experiences of the roughly one hundred organizations.

The NORDIKA project studying the measurement and reporting of intangible assets was carried out during 1999 and 2001. In the project, a questionnaire-based survey was conducted out. 345 companies from the Nordic countries participated in the survey. The survey examined the views in companies regarding intangible assets from several perspectives including measurement and reporting. (Nordika, 2000) Some of the results of the survey have been discussed in Chapter 1.2.2. Based on the NORDIKA project, another project called the FRAME (Joint framework for methods of knowledge management and communication) was carried out during 2001 and 2003. It attempted to further develop the practices related to measurement and reporting of intangible assets in cooperation with a network of Nordic companies (Frame, 2003).

The Centre for Business Performance at Cranfield University in the UK is carrying out a research project on the “measurement of knowledge assets” (CBP, 2003). The objectives of the ongoing research are to develop a framework for measuring a company’s capabilities and knowledge assets, to develop tools and techniques that help managers to design and use measures for managing the capabilities and knowledge assets of their companies and to link the new framework to the Performance Prism measurement framework. The project description includes hardly any information regarding research methodology. It is only stated that the research has included several knowledge-intensive organizations. The researchers have examined how the organizations manage, measure and report their intangible assets. So far the research has resulted in the Knowledge Assets Cycle model (see Chapter 3.2.2.9). One part of the model, the Knowledge Asset Map, has been developed based on case studies and reviewing existing models (Marr et al., 2002, pp. 283 - 289). In the case studies, the views of the executive management of three e-business companies

regarding the strategic capabilities have been examined. The research method was semi-structured interviews.

Shulver et al. (2000) have examined in a case study the same issue as this thesis, i.e. the process of developing measures of intangible assets. They state that the taxonomy models of intangible assets are not useful in developing strategically relevant measures because they lack the connection to strategy. Also the generic measurement models are not useful because of the context-specific nature of the measurement. Instead, they suggest that measures should be developed using the Balanced Scorecard type of design process in which the measures are based on strategy. They illustrate the Balanced Scorecard design process in the case company but fail to provide any actual process model for developing measures of intangible assets. Their study concludes by stating that there is a need for a process model that facilitates the development of measures of intangible assets that are consistent with the organization's strategy.

Two studies have examined the integration of the methods of traditional performance measurement and the more contemporary intangible assets measurement. First, Lövingsson et al. (2000) have done a descriptive case study on the processes that are used by Ericsson to manage and measure intangible assets. At Ericsson, the different categories of intangible assets are first identified. Then, the categories are used as the measurement perspectives of the Balanced Scorecard. In this way the important intangible assets and the strategic objectives can both be managed. The article is quite brief and it does not offer any examples or evidence regarding the usefulness or effectiveness of the process. However, it offers a concrete method for combining the two different frameworks. Second, Wingren (2002) has carried out a conceptual analytical study regarding the concepts of the Balanced Scorecard and intellectual capital. The purpose of the study has been to create a model that combines the tangible (Balanced Scorecard) and intangible (intellectual capital) measurement systems. The research is theoretical and based on analysing the existing literature. The resulting model is called the BSC^{IC} (see Table 16).

Table 16. The components of the BSC^{IC} model. (Wingren, 2002, p. 607)

BSC	IC
Financial	Expectations
Customer	Image
Internal processes	Internal structure
Learning and growth	Learning and innovativeness

The components of the BSC^{IC} model are described in Table 16. The left-hand side of the model is intended for identifying, measuring and managing tangible assets while the right-hand side of the model is intended for identifying, measuring and managing intangible assets. The strategic management activities and the activities carried out by employees form the link between the tangible and intangible parts of the model. Wingren (2002, p. 609) considers the study a theoretical prestudy and offers the theoretically created BSC^{IC} model as a basis for empirical research. On the basis of the article the benefits and the applicability of the model remain unclear. Therefore, empirical studies are necessary before any conclusions regarding the usefulness of the model can be drawn.

Bukh et al. (2002) have examined the Balanced Scorecard and the intellectual capital statement that were both used simultaneously in a case company. The intellectual capital statement was mainly used as an external reporting tool while the Balanced Scorecard was considered more suitable as a managerial tool. The two tools were considered complementary.

Some studies have focused on developing measures of specific intangible success factors. Hunt (2003) has examined the concept of knowledge and presents a method for measuring a person's knowledge. Ståhle et al. (2002) have developed a measurement method and a practical tool for measuring the renewal ability of an organization. Renewal ability of an organization refers to the organization's capacity to renew its strategies, operations and knowledge (in order to stay competitive in a dynamic business environment). The measurement tool is called the KM-factor¹⁴ which is a questionnaire-based method.

¹⁴ Ståhle Oy has applied for the trademarking of KM-factor.

The reporting, i.e. the organization's external reports, of intangible assets has been studied quite a lot. The doctoral research by de Pablos (2003) studied the reporting of intangible assets in Spanish companies. Intangible assets reporting was approached using three methods. First, the reports from companies operating in Asia, the Middle East and Europe were analysed. The results show, e.g., that the reports focus on three major areas: human, relational and structural assets. Second, a questionnaire survey was conducted in May 2000. The goal of the survey was to determine to which extent the Spanish companies are reporting their intangible assets. The results showed that, at the time of the survey, the reporting of intangible assets was not a widely applied practice. The importance of "knowledge-based resources" had been identified but the actions related to measuring or reporting them have been limited. Third, based on the survey, five companies' intangible assets reports were chosen for a more in-depth examination. The results showed, e.g., that the companies used the Navigator model as a basis for their reports and that a significant aspect of the reports is to address the importance of knowledge management. The study also included a comparison of the intangible assets reporting of the Spanish companies and foreign companies. Reporting of intangible assets has also been studied by, e.g., Guthrie (2001), who studied the annual reports of nineteen Australian companies and Williams (2001), who studied the annual reports of 31 UK companies.

Because of the large number of studies on the measurement of intangible assets and the variety of measurement methods that have been developed, it is no wonder that several studies have examined, analysed and reviewed the existing measurement methods (Bontis, 2001; Bontis et al., 1999; Del Bello, 2002; Guthrie, 2001; Guimón, 2002; Liebowitz and Suen, 2000; Petty and Guthrie, 2000). Some of the literature reviews have also examined the research that has been carried out. One finding is that practice, i.e. the work of innovative companies, has advanced the field of measuring intangible assets significantly (see e.g. Petty and Guthrie, 2000, p. 161). Petty and Guthrie (2000, p. 168) have also stated that during the time of their study most of the research had been carried out using case studies and surveys. They suggest that the action research method should be used more in order to capture the richness of the variables involved and to provide an appropriate context for the interpretation of the findings. In addition, they consider that more studies should use multiple research methods to verify and provide more understanding of the research results.

Marr and Schiuma (2002) studied all the papers that were presented at the first and second International Conferences on Performance Measurement and Management, which were held in 1998 and 2000. The analysis consisted of 94 papers from the 1998 conference and 90 papers from the year 2000. The results showed, among other things, that the research on the measurement models of intangible assets had increased in the year 2000. However, the authors consider that the Balanced Scorecard has been overemphasized in the studies and that research should focus more on other models, especially on intangible assets and stakeholder related models. The results of the study also suggest that the “research that most impacts the field” has been action research and case studies. Wingren (2002, p. 604) has also noted that the use of empirical research methods including action research and case studies has increased. However, he wonders if they have been used too much. According to him, also other types of approaches should be used.

Questionnaire-based research methods have also been used in some studies. For example, O’Regan et al. (2002) used a postal questionnaire to study the views of the chief financial officers in the Irish Information and Communications Technology sector regarding, e.g., the role of intangible assets as a source of competitive advantage. Also Jain and Rangnekar (2002) conducted interviews in which a questionnaire was used to study intangible assets and business performance in Indian companies.

Other research themes related to the measurement of intangible success factors, but not very relevant to the focus of this thesis, will be only mentioned briefly. Such themes include the financial accounting of intangible assets (see e.g. Choi et al., 2000; Høegh-Krohn and Knivsfå, 2000) and the monetary value of intangible assets (see e.g. Dekker and de Hoog, 2000; Klock and Megna, 2000).

5.1.2 Summary of current research

During the past five years, several large research projects related to the measurement of intangible success factors have been carried out. Especially the European research community has been active in this field. The main outcome of many of the projects has been models and guidelines for managing, measuring and reporting intangible success factors. Based on the large research initiatives, network-based projects are currently being carried

out. Measures of specific intangible assets have been developed in smaller projects. Few studies have examined the integration of the methods of traditional performance measurement and the more contemporary intangible assets measurement. However, this issue would still seem to require more examination.

From the methodological point of view, the research has also been versatile. The research methods and approaches have included case studies, questionnaires, interviews, analyses of reports, action research, literature reviews and conceptual analyses. In addition, multi-method approaches have been used in some studies. It should be noted that there is overlapping in the list presented above. For example, a case study can consist of interviews and an analysis of reports. However, it seems that there are no obvious shortcomings from the point of view of the methods of studying intangible success factors. Case and action studies examining organizations' measurement practices have thus far been a major contributor to the research field.

5.2 Present knowledge on measurement of intangible success factors

5.2.1 Designing measures of intangible success factors

5.2.1.1 Integrating approaches to designing measures of intangible success factors

A lot of research has been carried out regarding the design of performance measures and measurement systems. The problems experienced in practice in designing performance measures of intangible success factors suggest that their design involves some specific characteristics. However, these specific characteristics have not yet been determined in earlier research.

Currently, there are no practical step-by-step process models specifically for designing measures of intangible success factors. For example, Bontis et al. (1999, p. 399) have presented a process model that shows the basic phases of designing measures. The model starts with strategy and proceeds through identifying relevant categories of intangible assets to identifying key success factors and their measures. In this model, as with many others, it remains unclear how exactly the factors to be measured are chosen and the measures defined. The current models include steps (e.g. choose success factors based on strategy,

choose measures) and criteria (measures should be valid, reliable and practical) that should be addressed. However, the practical methods for carrying out the steps and meeting the criteria are lacking.

Because there is a lack of a specific process for designing measures of intangible success factors, it is possible to seek information regarding designing from the general design and implementation processes (discussed in Chapter 4.2) and from the various measurement frameworks that include the measures of intangible success factors (discussed in Chapter 3). This chapter focuses on the process-level of designing measures of intangible success factors.

Figure 34 shows the key phases and activities in designing measures. It also shows some relevant questions that should be answered in order to find a more practical model for designing measures of intangible success factors. The figure was created by the author in order to highlight the key questions that this research aims to address regarding the design of intangible success factors. In the following part of the chapter, the five questions in Figure 34 are examined based on the literature. The goal is to find answers to the questions as well as identify gaps in current knowledge.

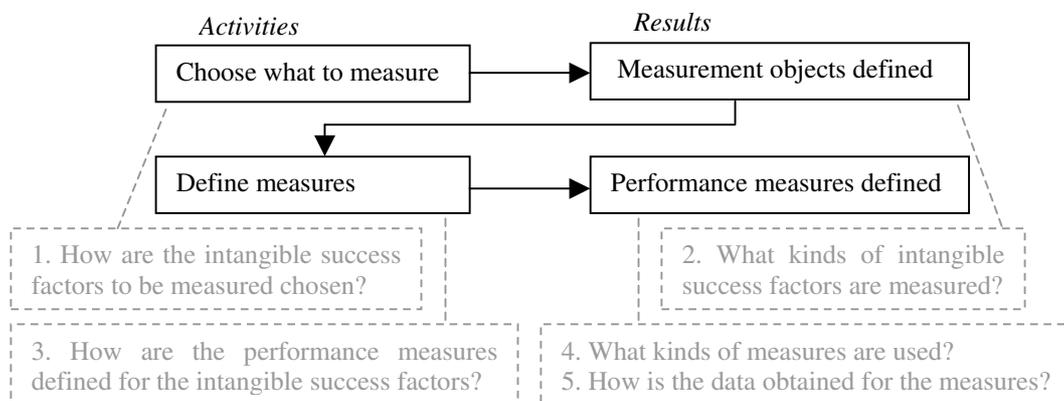


Figure 34. Key phases and activities in designing measures of intangible success factors.

There seems to be quite a clear consensus regarding some aspects of choosing which intangible success factors should be measured. Table 17 presents different approaches for choosing which intangible success factors to measure. According to most frameworks, the basis for choosing what to measure should be business objectives that are based on the organization's strategy (Bontis et al., 1999; Kaplan and Norton, 1996; Marr and Schiuma,

2001; Meritum, 2001b; Mouritsen et al., 2003a; Neely et al., 2002; Roos et al., 1997; Sveiby, 1997).

Table 17. Different approaches for choosing which intangible success factors to measure.

Approach / Model	How to choose what to measure?
Performance measurement (the Balanced Scorecard and other frameworks)	Based on business objectives; strategy (Kaplan and Norton, 1996) or stakeholders needs (Neely et al., 2002). A limited number of factors relevant to business objectives are chosen, balanced set from various perspectives, links between success factors are identified.
Intangible Assets Monitor	Factors are chosen based on the strategy. However, the way the linking is done is not clear. Also the user and the purpose of measurement affect the choice of what to measure. (Sveiby, 1997)
Navigator	Use standard measures; no guides for application in specific situations. (Edvinsson and Malone, 1997)
Meritum	Based on strategic objectives, critical intangible resources and activities are identified. (Meritum, 2001b)
Danish Guidelines	Based on the knowledge narrative, management challenges are identified and initiatives designed. Measures are based on these. (Mouritsen et al., 2003a)
IC Audit	The starting point is the purpose for measurement, based on that the measured assets are chosen. Only the most relevant factors are measured. (Brooking, 1996)
IC-Index	The importance of different intangible assets varies regarding the strategy that is used. Thus, the factors that are measures should be chosen on the basis of the organization's strategy. (Roos et al., 1997)
Value Chain Scoreboard	The nine boxes regarding the different phases of the value chain include areas that should be measured. Relevant factors are chosen. (Lev, 2001)
Knowledge Audit Cycle	Choosing which knowledge assets are measured should be linked to strategy. This can occur either top-down or bottom-up. Identification of the knowledge processes corresponding to the key knowledge assets. In the third phase, actions related to, e.g., enhancing the knowledge processes are planned to improve the knowledge assets. (Marr and Schiuma, 2001)
EFQM	The EFQM model suggests nine areas that should be assessed. (EFQM, 1999)

Important determinants in choosing the success factors are the purpose of measurement, i.e. why measure, as well as the user of the measurement results (Brooking, 1996; Sveiby, 1997). It is also suggested to focus on the most relevant, or critical, factors (Brooking, 1996; Lev, 2001; Mouritsen et al., 2003a). There are two main reasons for this. The first is to not lose the focus of managerial attention and, the second, to keep resource consumption at a reasonable level. Finally, it is suggested that there should be a balanced set of factors that are measured (Kaplan and Norton, 1996; Marr and Schiuma, 2001; Sveiby, 1997). There are various different models according to which the balance can be achieved. It would seem that it is possible to get a balanced set of factors by using almost any of them. The choice can probably be made on the basis of what seems the most appropriate in a particular situation.

Intangible success factors are basically of two types: intangible resources and activities related to them (Meritum, 2001b). When further descriptive terms are used, they can be classified into many other types. Table 18 presents different classifications of intangible success factors. These classifications are useful if certain issues should be emphasized. The driver and outcome division refers to results (outcomes) and activities or other factors that affect or cause the result (drivers) (see e.g. Kaplan and Norton, 1996). This is similar to the division by Mouritsen et al. (2003a): effects (e.g. improvements in quality and customer satisfaction), activities related to improving knowledge resources and the resources themselves. It should be noted that sometimes the resources are considered effects, and vice versa. For example, customer loyalty may be an objective (an effect) that is addressed by, e.g., improving customer service. On the other hand, customer loyalty can be considered a means (a resource) for improving revenue.

Table 18. Types of intangible success factors that are measured according to different approaches.

Approach / Model	What kind of intangible success factors are measured?
Performance measurement frameworks	Whichever are relevant: driver and outcome; input, process and output; direct and indirect. (see e.g. Kaydos, 1999; Uusi-Rauva, 1996b)
Intangible Assets Monitor	Growth/renewal, efficiency, stability of intangible assets. (Sveiby, 1997)
Navigator	Stock and efficiency of intangible assets. (Edvinsson and Malone, 1997)
Meritum	Intangible resources and activities. (Meritum, 2001b)
Danish Guidelines	Usually, three types of factors are measured: 1) effects, 2) activities related to improving knowledge resources and 3) the resources themselves. (Mouritsen et al., 2003a)
IC Audit	Identify and measure the most relevant aspects of intangible assets regarding the goals. (Brooking, 1996)
IC-Index	Measure the stock and flow of intangible assets. (Roos et al., 1997, p. 81)
Value Chain Scoreboard	Financial & non-financial, tangible & intangible issues, drivers & results, resources & activities. (Lev, 2001)
Knowledge Audit Cycle	Key knowledge assets are identified in the process. Different assets should be measured in a balanced way (e.g. using the Knowledge Assets Map). (Marr and Schiuma, 2001)
EFQM	The nine areas of the EFQM model cover comprehensively different enablers and results. (EFQM, 1999)

The above-mentioned classifications identify the different types of factors that can be measured. In addition to them, there are other approaches that help define the factors and make them more measurable. One such approach is indirect measurement (see Chapter

4.1.2). The Intellectual Capital Audit model suggests another approach for defining intangible success factors so that they can be measured (Brooking, 1996). An intangible asset consists of various aspects. For example, different aspects of the asset 'customer base' include size, repeat business, customer profile and brand loyalty. Only the most relevant aspects regarding the business objectives should be measured. At first glance, many of the intangible success factors seem undefined and vague. It seems easier to find more concrete measurement objects by dividing a factor into smaller and more specific components.

Many of the performance measurement frameworks include the concept of causal relationships between success factors (see e.g. Kaplan and Norton, 1996, Neely et al., 2002). Certain factors are considered outcome factors while others are considered drivers that cause or somehow affect the outcome factors. For example, customer loyalty may be a driver for sales volume and employee competency may be a driver for efficient operations. The intangible assets literature discusses the same issue using different concepts. The flow of intangible assets, i.e. the transformation of certain assets into other types of assets, should also be considered in measurement (Roos et al., 1997, p. 81). The same examples presented above can also be presented using the other concepts. Customer loyalty is related to relational assets. The goal is to transform that asset into financial assets, i.e. increased sales in this case. Similarly, employee competence (related to employee assets) should lead to efficient operations (related to structural assets). Thus, despite the conceptual differences, it is here suggested that the phenomena are similar if not the same. Nevertheless, the dynamics between the factors that are measured is an important phenomenon and should be taken into account when choosing what to measure and when interpreting the results.

Finally, when the goal is to support the achievement of a business objective by measurement, the conceptual question of whether the measured factor is tangible or intangible would seem to be irrelevant. For example, Lev's (2001) Value Chain Scoreboard may consist of financial and non-financial issues, tangible and intangible issues, drivers and results and resources and activities. Thus, what is important is to find useful measures of important issues regardless of the type of factors they can be classified into.

Performance measures are often specifically designed for each case. The measures may be quite similar in different organizations but there may still be many situation-specific differences. Sometimes standard-type measures exist that can be chosen for measuring a

factor. For example, the number of patents per year is a quite straightforward measure of patent volume. At other times it is impossible to choose any existing measures; rather, one must be specifically designed for the situation.

The purpose of the measurement affects also the choice of performance measures. There are different criteria for measures, depending on whether they are used for external or internal purposes. Measures should be standard and comparable between companies when they are used in external communication (Edvinsson and Malone, 1997; Meritum, 2001b). For internal purposes, it is more important to find measures that are relevant from the point of view of the business objectives, despite the fact that those measures are often situation-specific (Kaplan and Norton, 1996; Mouritsen et al., 2003a; Roos et al., 1997; Marr and Schiuma, 2001). Regardless of the purpose, certain general criteria should be met. They include, e.g., reliability and practicality (see e.g. Emory, 1985).

The practical properties of performance measures can be defined using the measurement principles, i.e. the performance measurement record sheet (Neely et al., 1996, pp. 64 - 67; Rahiala, 1985, p. 58; Uusi-Rauva, 1996a, p. 33). They consist of several practical aspects of measures, e.g. how often to measure, who is responsible, how the results are reported, which define how the measurement is carried out in practice. When these aspects are defined, the implementation and use of the measure should be easier.

As mentioned in Chapter 4.1.2, there are many ways for measuring. The two main types of measures of intangible success factors are subjective and objective measures. They both have positive and negative qualities, depending on the situation. In addition to subjective and objective measures, also other classifications of measures are used. For example, Edvinsson and Malone (1997) classify them into direct count, monetary and percentage measures. The Meritum Guidelines (Meritum, 2001b) suggest that, e.g., general, company specific, financial and non-financial measures can be used.

Performance measures are based on some form of data or information from the organization or its stakeholders. Thus, defining the data source of a measure is an important phase in designing the measure. Implementation of a measure cannot occur before the data source is defined and a method for collecting the data is available. Sometimes the organization's existing information systems provide the data. When financial and operational issues are

measured, the data can often be collected from existing information systems, e.g., financial accounting or production planning systems. However, in the case of intangible success factors, there may not be any information systems that provide the data. In these cases, new data collection methods must be designed. Questionnaires are one typical method for gathering the data for the measures of intangible success factors.

The data sources of measures is an issue which has not been written about much in the literature (see Chapter 4.4.3). The basic view is that the existing data sources are usually preferred if possible. However, they should not guide the choice of what to measure. The Meritum Guidelines (Meritum, 2001a, p. 13) suggest that support activities should be designed that can be used to monitor the intangible activities and their impact on the intangible resources. The information needed for the measurements can be collected from the organization's databases, internal documents and reviews, questionnaires and interviews for, e.g., employees and customers, the accounting system and various external sources (Johanson et al., 2001; Meritum, 2001a, p. 29). In the Intellectual Capital Audit, the auditing methods are specifically designed (Brooking, 1996).

5.2.1.2 Summary of the design phase

The key issues in choosing what to measure include the following: The measurement situation and the purpose for which the measures are used are the starting point of designing measures. It affects what factors are measured and what measures are used. In managerial use of measurement, measures are based on the organization's strategy. More practically, measures are based on business objectives or actions that are related to the objectives. The intangible success factors related to business goals are usually intangible resources, i.e. the amount and quality of an asset, e.g. image. Likewise, the actions are some activities that relate to the assets, e.g. a marketing campaign (see Figure 35).

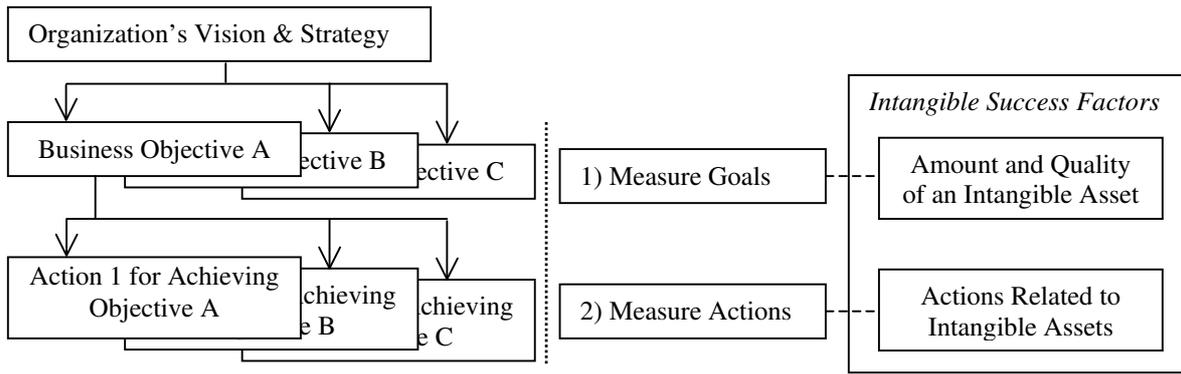


Figure 35. Choosing which intangible success factors should be measured.

There are several frameworks that show which issues should be measured. The common idea is that there should be a balanced set of factors measured from different perspectives. The balance can be achieved using one of many frameworks, e.g. the Balanced Scorecard or the Intangible Assets Monitor. In addition, only the critical success factors from the point of view of achieving business objectives should be measured.

Performance measures are primarily designed or tailored case by case. The purpose of the measurement affects also the choice of the performance measures. There are different criteria for measures, depending on whether they are used for external or internal purposes. The intangible success factors can be measured using two main types of measures: 1) subjective measures, i.e. measures based on questionnaires and evaluations, and 2) objective measures, i.e. measures describing objectively the measurement object. Figure 36 presents a basic model for designing measures of intangible success factors.

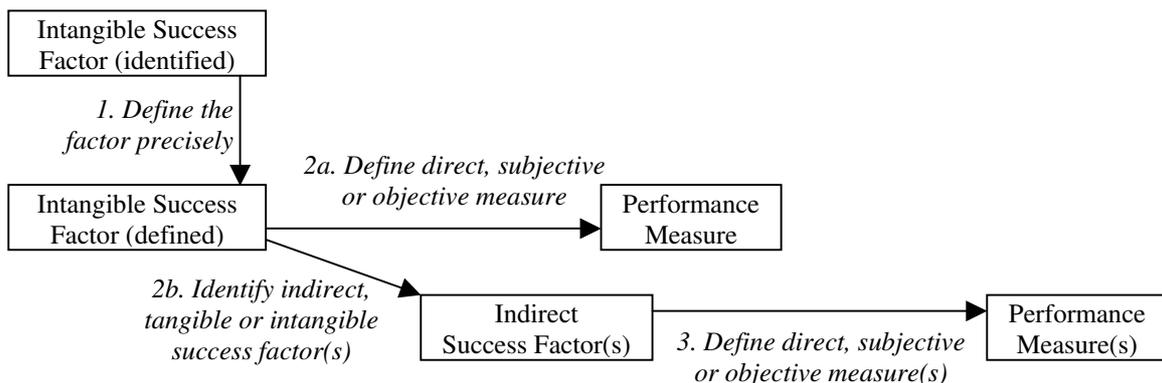


Figure 36. Designing performance measures of intangible success factors.

The above model can be connected to that presented in Figure 35. When success factors have been chosen, measures can be defined for them. The first step is to define the factor precisely, i.e. to define the aspect that is to be measured. For example, regarding the factor

customer satisfaction, it must be known which customers should be satisfied and what they should be satisfied with. After defining the factor, a direct measure can be defined. It may be a subjective, e.g. questionnaire-based, or an objective measure. A feasible direct measure cannot always be found. Therefore, indirect measures must sometimes be used. This is carried out by first identifying a factor that is considered to be related to the original factor and then defining a measure for that factor.

A key point in designing useful performance measures is to determine how to get the data needed for the measures. In the case of intangible success factors, there may not exist any information systems that provide the data. In these cases, new data collection methods must be designed. These include typically questionnaires and other subjective tools.

It seems that the specific problems in designing performance measures of intangible success factors are related to the immaterial nature of the factors and the lack of information systems to provide the data needed. However, there is still a lack of knowledge regarding how the measures of intangible success factors are designed in practice and what kinds of challenges are actually experienced.

5.2.2 Implementing measures of intangible success factors

Implementation of performance measures consists of various activities that make it possible to start using the performance measures designed. The activities include technical issues, e.g. creating information handling and reporting procedures, and operational issues, e.g. educating employees. (Bourne et al., 2002; Hannula et al., 2002; Malmi et al., 2002). Similarly as with designing the measures of intangible success factors, there is a lack of research regarding the specific aspects of implementing measures of intangible success factors. In earlier studies, implementation of the measures of intangible success factors has been considered very difficult (Dion, 2000; Neely et al., 2002; Nordika, 2000; Chapter 1.2.2). It may not even be possible to start the implementation phase because no sound measures can be created.

There is quite a lot of information about implementing performance measures in general (see e.g. Bourne et al., 2000; Leinonen, 2001; Malmi et al., 2002; Chapter 4.2.4). This

knowledge is mainly on implementing performance measurement systems, not on implementing certain individual measures. The causes for failure in implementing performance measures may include resistance to measurement, problems with information systems, deficient commitment from the management, lack of resources, poorly defined measures and disturbing actions of the parent company (Bourne et al., 2000; Hacker and Brotherton, 1998; Leinonen, 2001). The specific characteristics of implementing measures of intangible success factors are not known. Similarly, the specific causes why implementing measures of intangible success factors is difficult are not known.

5.2.3 Using measures of intangible success factors

The use of performance measurement has not been studied as much as the other two phases of measurement, i.e. designing and implementing (Neely et al., 2000, p. 1143). The use of performance measures of intangible success factors has been studied even less. There is quite a lot of knowledge regarding the use of performance measurement in general. However, there is only little practical experience regarding the use of measures of intangible success factors. This is partially due to the fact that the measures of intangible success factors could not be implemented in practice.

It must be noted that there is experience regarding some measures of intangible success factors, e.g. questionnaire-based customer and employee satisfaction measures (see e.g. Kaplan and Norton, 1996; Neely, 1998). However, the use of these measures has not received any special attention.

Some of the measures of intangible success factors presented in the literature seem naïve or otherwise faulty. Examples of these possibly problematic measures were presented in Chapter 4.1.3. For example, very indirect measures may not be considered relevant. Because it may be difficult to design good measures, managers may make compromises and design less than perfect measures. This may lead to a situation where the persons using the measures do not experience them as very useful.

The general problems that may hamper the use of measurement include general measurement-theoretical problems, current performance measures and measurement

systems, definitions of the performance measures, the nature of the business and operating environment, information systems and organizational culture (Lönqvist, 2002). The specific problems related to using measures of intangible success factors are not known.

5.3 Direction and methods for further research

5.3.1 Gaps in current knowledge

Some issues still need more research to make the application of measures of intangible success factors easier in practice. One thing that is missing is a comprehensive process model that includes all phases, starting from the initial recognition of a need to measure intangible success factors and ending up with performance measures that produce useful measurement results (cf. Shulver et al., 2000). On the way to achieving that, some smaller issues should also be examined. First, the current process models consist mostly of steps that should be carried out and criteria that should be met. The question regarding *how* they can be done in practice needs more attention. Another issue is the data sources of measures of intangible success factors, which has not been studied very much yet.

The phases in designing measures of intangible success factors seem quite straightforward. On the other hand, designing measures of intangible success factors has been considered difficult in practice. There are at least two main reasons that could explain the contradiction. First, the current measurement models may focus too narrowly on just choosing what to measure and on defining the measures. There are also other phases in the measures design process that may affect how useful the measures are considered. Figure 37 presents the author's interpretation of the entire process that starts from the initial need for measurement information. Then, the process proceeds through the design phase. After the measures have been designed, they can be implemented, i.e. put into practice. Finally, the measures produce information that can be used for, e.g., decision-making. The iterative process consists of phases and activities between phases. The assessment of the soundness of the measures, e.g. validity, practicality, reliability and relevance, can be assessed in three phases. First, when a measure is defined, its validity and practicality can be assessed. Second, after implementation, more is known about the measure's practicality. Finally, the

final assessment of the soundness of the measure can be made only after using the measurement information.

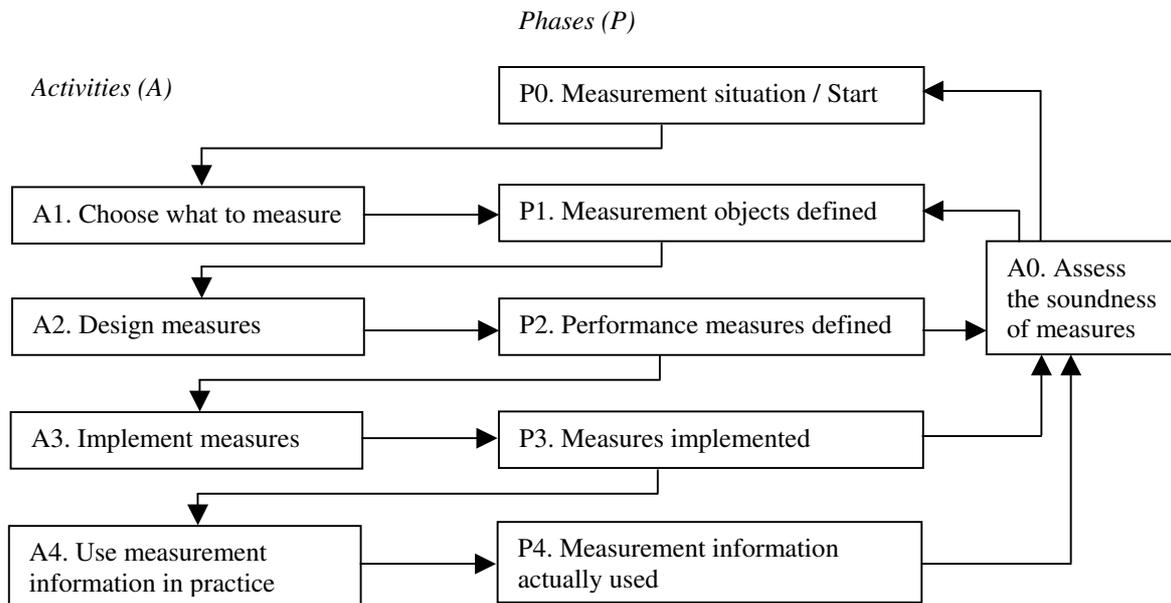
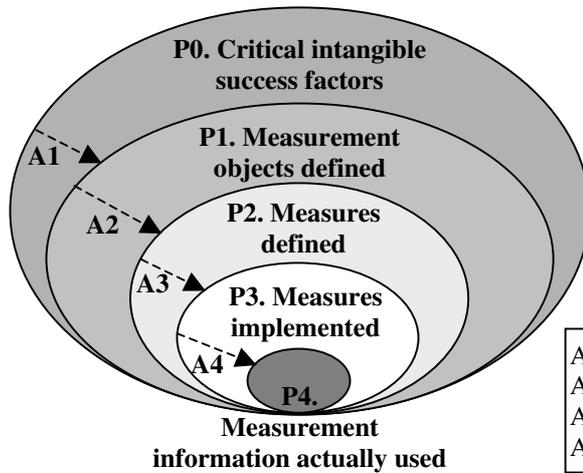


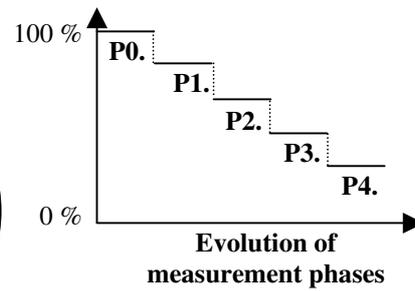
Figure 37. Main phases in creating sound performance measures.

The second possible reason for the contradiction between the theory and practice is that the picture given by the normative literature may be too simplistic and optimistic compared to the real world in organizations. There may be many other issues affecting the phases of measurement in practice. Examining how the phases of measurement are carried out in practice could offer information about them. Case studies have already been carried out but, for some reason, they have not resulted in more explicit information regarding the problems and challenges related to designing measures of intangible success factors (cf. Chapter 5.1). Figure 38 illustrates this proposition in relation to the model of the phases in creating sound performance measures. It is suggested that the validity and relevance of a measurement system, i.e. a group of measures of intangible success factors, as experienced by managers decrease as the different phases of measurement progress. In other words, the measurement information that is actually used represents only a small portion of the intangible success factors that were originally identified as critical. This proposition is supported by the findings of Stivers et al. (1998).

The size of the circle represents the “coverage” of the success factors



Percentage of critical intangible success factors covered



- A1. Choose what to measure
- A2. Define measures
- A3. Implement measures
- A4. Use measurement information in practice

Figure 38. Validity and relevance of a measurement system as experienced by managers decrease as the different phases of measurement progress.

In the figure above, the starting point is ‘P0’, which represents an ideal situation where all the necessary information regarding the intangible success factors of a specific measurement situation is available (100 % coverage of the relevant success factors). The first action carried out is to choose which factors to measure. This results in ‘P1’ where the measurement objects are defined. All relevant factors may not be identified and it may be decided not to measure some relevant factors for some reason. Thus, the success factors chosen to be measured may not cover all the issues that ideally should be measured. The second action carried out is to define measures of the intangible success factors, which results in ‘P2’. Because of, e.g., the characteristics of the measures, the coverage of the success factors is not likely to be complete. In the third phase, the measures are implemented, resulting in ‘P3’. There may appear some practical problems causing some measures to be changed or deleted. Again, the coverage of the success factors may decrease. After the measures have been implemented, they start producing measurement results. The final phase is to use these results to make decisions (‘P4’). It is not clear to what extent the measurement information is actually used and how much it differs between measures.

Currently, it is unclear whether the model above actually applies in practice. The importance-measurement gap and the measurement-use gap identified by Stivers et al. (1998) suggest that it might represent the actual situation. In addition, there is no knowledge regarding the reasons why the coverage decreases in each phase of the performance

measurement. Actually, there is quite a lot of knowledge regarding generic problems of performance measurement but the specific issues related to the measures of intangible success factors are not known. Examining these issues in practice might lead to finding more practical ways for designing and implementing sound measures of intangible success factors.

5.3.2 Filling the gaps in the doctrine

In this chapter, the possibilities for advancing the research field are discussed. The issue is approached from the point of view of the gaps in current knowledge that were identified in the previous chapter.

Designing measures of intangible success factors has been identified as problematic. The measures are designed – and the problems occur – specifically in each organization. Thus, a natural choice for studying the issue is to examine it in organizations that are measuring or developing measures of intangible success factors. Action research and case research are research methods that have proven very useful in this type of situation (Marr and Schiuma, 2002; Petty and Guthrie, 2000). Wingren (2000) has suggested that case studies have been used even too much. However, it does not seem rational to discard a method considered effective just because it is used a lot.

The different phases of measurement cause some challenges when the process of measuring intangible success factors is studied. First, the design and implementation phases may be carried out within months. However, using the measures is a continuous process. Therefore, studying these different phases may take a long time. Second, the researcher must somehow gain access to the research material (Gummesson, 2000, p. 14). It may be difficult to gain long-term access to the everyday management situation unless the organization examined is the one in which the researcher works. Third, multiple methods may have to be used in order to gain access to the research material when examining the different phases of measurement. On the other hand, Petty and Guthrie (2000) have suggested that more research should be carried out using multiple research methods.

5.4 Summary of present knowledge and positioning of this research

There is plenty of literature regarding the measurement of intangible success factors. For example, there are several frameworks available for designing a system for measuring intangible success factors. However, it seems that there is a gap in the doctrine regarding the process of measuring single intangible success factors. Also the practical problems in the measurement of intangible success factors are most clearly manifested regarding designing the single measures of intangible success factors. The process of measuring has been studied regarding performance measures and measurement systems in general. However, the specific issues, e.g., the problems, related to designing, implementing and using intangible success factors are mostly unknown.

So far, the research on the measurement of intangible success factors has been versatile. Various research methods have been used and different aspects of measuring intangible success factors have been examined. Case research has been used a lot and it has also proven to be effective. It seems that also in the future using case research may provide new insights into the measurement of intangible success factors.

This research attempts to make a contribution to prior research in the intersection of the following areas (see also Figure 39). First, the examination spans the three phases of measurement. Second, only the measurement of intangible success factors is examined. Third, measurement is examined at the level of individual measures, not measurement systems. There has been some previous research regarding each of these aspects. However, it has not been in the same context. For example, Bourne (2003) has discussed the three phases of measurement. However, his research focuses on performance measurement in general, not on the specific aspects of intangible success factors. Similarly, many of the process models for designing performance measurement systems (naturally) focus on the aspects of the measurement system while neglecting the issues and problems related to individual measures.

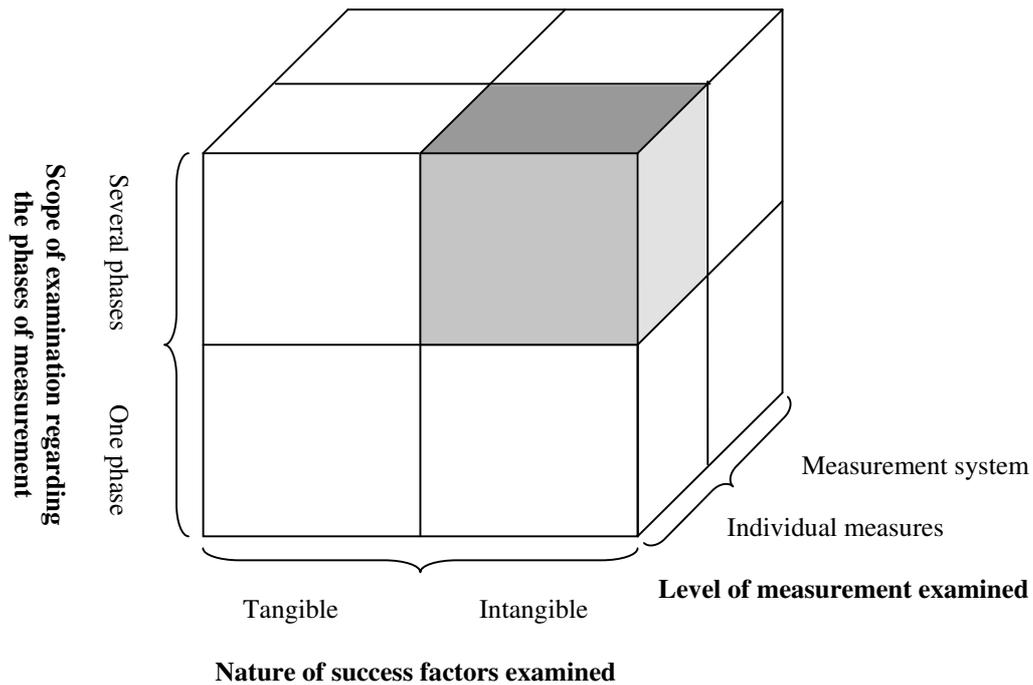


Figure 39. Positioning of the research.

The cube presented in the figure above represents certain aspects of performance measurement research. The grey area positions this research from the point of view of the criteria of the scope of examination regarding the phases of measurement, the nature of success factors examined and the level of measurement examined. These are some of the most important issues positioning this research, but others can also be mentioned. Two important factors are the limitations of the study presented at the beginning of the thesis: focusing on the managerial measurement methods and choosing the viewpoint of a small organization (the third limitation was already mentioned). The following empirical examination focuses on the area outlined in this chapter.

6 DESIGN OF THE EMPIRICAL EXAMINATION

This chapter begins by presenting an overview of how the empirical part of this research has been carried out. Then, applying the different research methods in practice is discussed. The chapter ends with the presentation of the three case organizations.

6.1 Overall description of the case studies

The empirical examination of the measurement of intangible success factors is based on three projects in which balanced performance measurement systems were designed and implemented for three Finnish organizations. The examination focuses on the different phases of measuring intangible success factors: design, implementation and use. The empirical examination was carried out in Finland during the years 2002 and 2003. It is related to a research project that was carried out at Tampere University of Technology. The project focused on studying performance measurement in knowledge-intensive organizations. Knowledge-intensive organizations can be recognized from the following characteristics:

- Intangible assets are their most valuable assets – physical assets, such as machinery, are of secondary importance (Edvinsson and Malone, 1997, p. 10).
- Gathering and applying new information and knowledge is essential for the success of the organization (Sydänmaanlakka, 2000, p. 25 and p. 255).
- They are flexible, adaptive, and they have low organizational hierarchies (Edvinsson and Malone, 1997, p. 9).
- They produce mass customized products and services using close relations with their customers, suppliers and strategic partners (Edvinsson and Malone, 1997, p. 9).

Although also other measures in addition to the measures of intangible success factors have been designed during the project mentioned, the case studies focus only on the intangible success factors, i.e. the traditional financial and non-financial success factors are not discussed. Each of the three case organizations is knowledge-intensive and thus the intangible success factors are very important for their success. For example, according to Okkonen and Hannula (2003, p. 233), an issue that distinguishes knowledge-intensive organizations from the more traditional organizations is that the key success factors of knowledge-intensive organizations are more oriented to resources, e.g., employees'

knowledge and skills. Therefore, these organizations are well suited for examining the intangible success factors.

The case studies include an action research part, an interview-based part and a focus group part. These different approaches are used because three different issues (design, implementation and use) are examined and the same research methods do not suit these different situations well. The following chapters explain in more detail the methodologies used. Table 19 illustrates the research issues, research questions and the methods used for accessing the data.

Table 19. Empirical examination of the measures of intangible success factors in case organizations.

Focus of attention	Research questions	Access to data
Designing measures	<ol style="list-style-type: none"> 1. How are the intangible success factors to be measured chosen? 2. What kinds of intangible success factors are measured? 3. How are the performance measures defined for the intangible success factors? 4. What kinds of measures are used? 5. How is the data obtained for the measures? 6. What kinds of difficulties were experienced regarding each of the previous steps and what caused them? 	Action research, taking part in the process as it occurs.
Implementing measures	<ol style="list-style-type: none"> 1. How is the implementation carried out? 2. What (types of) measures were difficult to implement? Why was that? 3. What (types of) measures were easy to implement? Why was that? 4. What factors external to the measurement project affected the implementation? 	Interviews (face-to-face & email)
Using measures	<ol style="list-style-type: none"> 1. When and where are the measures reviewed? 2. What activities are carried out based on the measurement results? 3. What mistakes have been made in designing and implementing the measures (that affect using them)? 4. What are the biggest problems in carrying out the measurements and in using the measures? 5. What (types of) measures are most useful? 6. What (types of) measures are the least useful? 7. How well do the measures meet the requirements set in the beginning of the project (how good are the measures in practice)? 8. How should the measurement system and / or the measures be further developed so that they meet better the needs of the users of the performance information? 	<p>Interviews (face-to-face [regarding the measures already in use at the time] & email),</p> <p>Focus group (i.e. group of 11 persons representing all three case organizations; discussions regarding issues related to using measures and the “goodness” of measures; session guided by the author)</p>

The empirical examination in relation to time is presented in Table 20. The work started during the spring of 2002 and the design phase was finished in the fall. The implementation occurred during the winter and the interviews regarding the implementation were held in the spring of 2003. In the fall of 2003, the examination regarding the use of the measures was carried out.

Table 20. The milestones of the empirical examination.

Organization	Dates of examination			
	<i>Design meetings</i>	<i>Implementation meeting(s)</i>	<i>Email questions sent</i>	<i>Focus group session</i>
<i>Alma Media</i>	4.4.-6.8.2002	29.10.2002 & 13.5.2003	22.8.2003	4.9.2003
<i>Technology Industries of Finland</i>	26.4.-5.11.2002	24.3.2003		
<i>Work Efficiency Institute</i>	12.4.23.8.2002	21.1. & 8.4.2003		

The following three chapters explain how the three different research methods have been applied. The research results are presented later. Results gained using a specific method are reported in separate chapters.

6.2 Research methods

6.2.1 Action research

Action research is a method whereby a researcher participates in an organization's activities and examines a situation while it is occurring. According to Coughlan and Coughlan (2002, p. 220), action research aims both at taking action and creating knowledge or theory about that action. Westbrook (1995, p. 18) has suggested that action research would produce results that are relevant to practitioners, that are applicable to unstructured or integrative issues and that contribute to theory. An action researcher acts as an agent of change or a facilitator in an organizational change process (Gummesson, 2000, p. 209). Action research is based on making observations about the research situation. Participant observation refers to the specific type of observation in which the researcher is an active participant in the group that is studied (Uusitalo, 1995, p. 90).

Action research was chosen as a method of examination in this research because it provides a good insight into the process of designing performance measures. It offered an access to data because the author participated in the design process as a facilitator. During the action research, measures of intangible success factors were designed for the three case organizations. The goal was to design measures for supporting the management of the organizations. A team of employees and managers in each organization were responsible for choosing the critical success factors to be measured as well as choosing appropriate measures. The author acted as a facilitator during the measurement system design project. As the facilitator, the author guided the discussions during the design meetings and actively participated, e.g., in ideating the measures. In addition to the author, one or two researchers participated in the design meetings in each organization as co-facilitators.

The three case organizations were different and, thus, all the measurement system design projects were somewhat different. However, there was a general framework that was used in all cases. The design process was modified from typical performance measurement system design processes (see e.g. Kaplan and Norton, 1996; Toivanen, 2001; Chapter 4.2.2). The following main phases were carried out:

1. Discussing and prioritising the importance of the organization's stakeholders and their needs.
2. Deciding strategic business objectives.
3. Choosing the measurement perspectives.
4. Choosing the critical success factors for each perspective.
5. Defining performance measures for each success factor.

Each project started with educating the team that participated in designing the measures regarding performance measurement. Also the specific goals and timetable for the particular project were decided at the beginning of the project. It took from four to seven group sessions of two to three hours per organization to go through the design phases. In addition, about the same time was used by the researchers and the personnel of the organizations to prepare for each session and to communicate to the personnel regarding the project.

The research data was composed of the working notes created in the design meetings and the experiences of the researcher. In each design meeting, the work was documented using a laptop computer. In addition, the descriptions of the design processes were created using the

researcher's experiences supported by the comments of the other researchers that participated in the projects.

6.2.2 Interviews

Interviewing is a research method in which an interviewer puts questions to an interviewee who responds verbally (Uusitalo, 1995, p. 91). In this research, interviews were used for two purposes: to get information about implementation and about the use of measures.

The researcher did not take part in implementing the measures. The employees of the case organizations carried it out. Thus, action research was not an option. Instead, the follow-up meetings that were held in order to see how the implementation proceeded offered a way for obtaining information about the implementation. The same researchers as before also participated in the follow-up meetings. The project group in each organization was interviewed about issues related to implementation. Especially the difficulties experienced were discussed. The researcher documented the interviews using hand-written notes. At the time of the implementation meetings, not all measures had been implemented. Because of this, some additional questions were later asked by email regarding those measures that had not yet been implemented. Email is a practical means of for interviewing because the researcher does not have to travel to case organizations and the respondents can answer when it suits them best. Additional questions can also be easily emailed afterwards if something needs further clarification. A weakness in using email is that the researcher cannot observe the respondents' reactions, i.e. non-verbal communication cannot be analysed.

Email interviews were also used as a way to get information about the use of the measures. The questions were directed to the contact person of each case organization. Three open questions were asked regarding each measure that had been implemented:

1. On what occasions have the results of the measure been reviewed?
2. What has been done on the basis of the results?
3. How well does the measure correspond to your needs? (How good is the measure in practice?)

As mentioned, these questions were aimed at assessing each measure individually. The following chapter discusses a focus group which was also used in order to get information about the use of the measures, but from a slightly different point of view, e.g. what types of measures have been experienced as most useful?

6.2.3 *Focus group*

A focus group is a specific type of interview. According to Morgan (1997), it differs from a typical interview in that a group of people are interviewed and their interaction creates the research data. The group is given a topic or a theme which it discusses relatively freely. The focus group discussion is moderated by a facilitator whose task it is to guide and trigger discussion. Single interviews and group interviews produce different data and it should be acknowledged when interpreting the results (Alasuutari, 1999, p. 153).

Focus groups consist of four main phases (Morgan, 1998, p. 4). The first phase is the planning of the focus group. Decisions must be made regarding the persons to interview, the level of structure of the interview, the size of the group and the number of groups. The second phase is recruiting the participants of the focus group. It is important to choose the right people and equally important to get them to attend the event. The third phase is to moderate the focus group. This includes asking questions that guide the discussion so that relevant topics are covered, the discussion provides data that is on a suitable level of detail and the members of the group interact with each other. The fourth phase is the analysis and reporting of the results. (Morgan, 1997 and 1998)

A focus group was organised in September 2003, about one and a half years after the beginning of the measurement projects. It was organized at the same time as a meeting at which the three case organizations had an opportunity to exchange experiences and ideas with each other regarding the performance measurement projects that had been carried out and the measures that had been developed. This offered a good way to get more information in addition to the interviews regarding the use of performance measures. In addition, a focus group is a very infrequently used method in studying performance measures or intangible assets. Thus, it was interesting to try it from a research methodological point of view.

Further, the focus group was considered a method that was very well suited for this type of situation.

The participants in the focus group were four people from Alma Media, two from Technology Industries of Finland and five from the Work Efficiency Institute. The representatives of Alma Media and Technology Industries of Finland were the same persons that had participated in the measurement project groups. Two of the representatives of the Work Efficiency Institute were also in measurement project group. In addition, three other persons, including the CEO of the Work Efficiency Institute, participated in the meeting. All of them represent the users of performance measurement. In addition to the people from the case organizations, also five researchers participated in the session.

Before starting the actual focus group discussion, all three case organizations presented their organization, the measurement project in their organization as well as the measurement system that was implemented. Each organization had about twenty minutes to give their presentation. This presentation round had two main purposes. First, it provided a context for comparison for the members of other organizations. Second, it was expected to speed up the focus group discussion when certain basic issues, e.g. what measures are used by each organization, were already known to all participants.

Before beginning the focus group, the researcher explained what the purpose of the focus group was, including the rules and objectives of the discussion. Each topic was to be discussed for about ten minutes. The author acted as facilitator of the event. This included introducing the topics of discussion, acting as moderator of these discussions and presenting additional guiding questions when necessary. The other four researchers documented the discussion. Documentation was carried out in the way that the comments from members of each case organization were documented separately by different researchers. In addition, the facilitating researcher also documented the whole discussion at a condensed and general level.

The focus group had six topics of discussion:

- What mistakes have been made in designing and implementing the measures?
- What are the biggest problems in carrying out the measurements and in using the measures?

- What (types of) measures are most useful?
- What (types of) measures are the least useful?
- How well do the measures meet the requirements set at the beginning of the project (how good are the measures in practice)?
- How should the measurement system and / or the measures be further developed so as to satisfy better the needs of the users of the performance information?

The actual focus group discussion took about one hour. The time was distributed quite evenly between each topic. The research data, i.e. the separate comments of the three organizations and the general description of the whole event, comprised about twenty pages of handwritten notes.

6.3 Case Organizations

6.3.1 Alma Media Interactive Oy NWS

Alma Media Interactive Oy NWS is an ICT business unit of a large Finnish media group, Alma Media Oyj. It provides the concern with technical services related to interactive media. The organization employs about thirty-five persons. They provide technical consulting and project management services and participate in various product development projects both as technical implementers and as designers of services. The main goal in constructing performance measures was to support the organization's knowledge and competency development activities. An important goal was also that the measures should not overlap the existing processes of knowledge management. Instead, the measures should support them.

The organization created an internal document during the measurement system project related to measuring and managing knowledge and competencies. The following text is a translated quotation from the document: "Measurement is used for gaining sharp-sightedness, i.e. to achieve the ability to identify opportunities and risks faster than the environment changes. Measurement is used for listening more accurately to the messages and feedback from customers and other stakeholders in order to use the information as a basis of planning. In addition, measurement is used to develop the ability to react, i.e. the speed and ability to respond to the possibilities and risks that are identified. Measurement is

also used to distinguish the essential information from the noise.” As the description shows, performance measurement is considered an important management tool in the case organisation. In addition, the requirements and expectations related to the information generated by performance measurement are quite high.

6.3.2 Technology Industries of Finland

The second case organization is the Technology Industries of Finland (formerly the Federation of Finnish Metal, Engineering and Electrotechnical Industries; in Finnish Teknologiateollisuus ry, formerly Metalliteollisuuden keskusliitto, MET). The measurement project was carried out in two groups comprising a little over twenty persons. Their work can be characterized as highly knowledge-intensive service. Their work consists of development projects in which various developing activities are carried out with the aim of improving, e.g., the technologies or market conditions of customer organizations. A network of experts, e.g. consultants and researchers, is also used for providing specific services for their customers.

The management of the organization hoped that the performance measurement system would provide a means for revealing the effects of the organization’s work in the projects it carries out in co-operation with its customers. An important consideration was that the organization has several stakeholders with different requirements. These requirements were also taken into account in designing performance measurement. In the project, two slightly different measurement systems were designed for the two departments. Because they are almost similar, only one of them is examined here.

6.3.3 Work Efficiency Institute

The Work Efficiency Institute (Työtehoseura ry) is a Finnish non-profit-making research and education organization. This case study concerns only the research activities of the Work Efficiency Institute. The research is carried out in different types of projects related to the fields of agriculture, forestry and household economy. The projects range from scientific research projects to practical appliance testing. The work is carried out by highly trained experts. Therefore, competent employees are considered a key asset in the organization.

The performance measurement system was constructed for the three research departments that altogether employ about forty-five persons. The main motivation for constructing a performance measurement system was to develop a tool for aligning the personal development of the employees with the requirements of the departments. In addition, the measurement system was designed for guiding the implementation of the strategy in general. A comprehensive description of the measurement system project and of the case organization is provided by Mettänen (2002).

7 EMPIRICAL OBSERVATIONS

This chapter describes how the different phases of measuring intangible success factors were carried out in practice in the three case organizations. The chapter is organized so that each of its second-level chapters consists of case descriptions based on one research method. Thus, the design, implementation and use phases are presented in different chapters. Experiences with the using phase are presented in two different chapters because they are based on two different research methods. This chapter consists of case descriptions which are analysed in Chapter 8.

7.1 Designing Measures

7.1.1 Alma Media

This measurement system project differs slightly from the two other cases. The organization already used some financial and non-financial measures. Therefore, this project mainly focused on identifying and measuring intangible success factors, i.e. the measures that would support the organization's knowledge and competency development activities. The connection of the new success factors and measures to the strategic goals and the existing measures was paid attention to.

A project group consisting of five persons from the case organization and three researchers carried out the designing of the performance measures. Altogether, four design meetings were held. In addition, the personnel of the organisation participated in the designing of measures during a development day. They discussed and designed the performance measures in groups. The role of the personnel was significant in ideating the practical measures.

Because the main focus of the project was on measures that would support the organization's knowledge and competency development activities, the Knowledge Audit Cycle model was used. The model was first used to identify and prioritise the critical knowledge and competencies of the organization. Then, the processes that are used to manage the knowledge and competencies were identified. Finally, the intangible success

factors were identified as a result of the two previous steps. These phases and their results are described in the following figure.

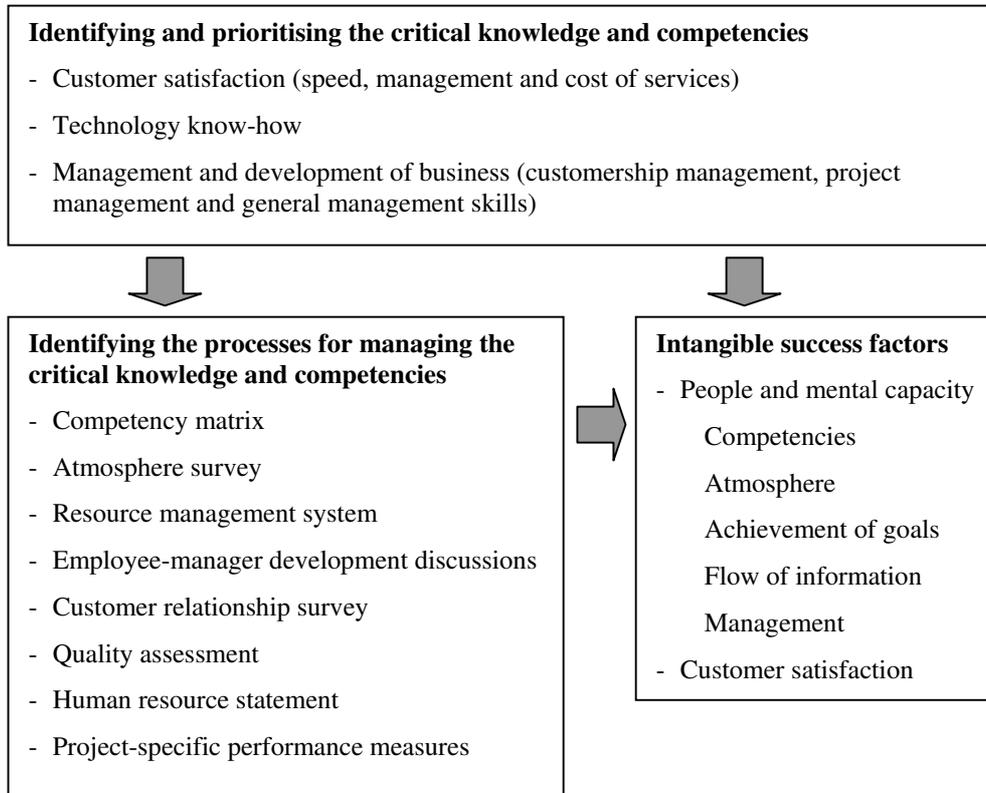


Figure 40. The phases in choosing the preliminary intangible success factors.

In the following meetings of the project team, the intangible success factors were further defined and the measures designed. An important element in deciding which factors to measure was the measurability of a factor. For example, *Flow of information*¹⁵ was considered quite difficult to measure. No measure could be designed for measuring it. However, it was decided to include a question regarding the flow of information in the personnel survey.

The existing processes and tools of knowledge management were used as a basis for defining measures. This was considered practical because the goal was not to create any new redundant management systems. For example, the employee-manager development discussions and competency matrix were used as data sources for the performance measures. In practice, defining measures consisted of ideating different ways to get

¹⁵ The names of the success factors are written in *italic* font style.

information about each success factor, considering how to turn the information into a measure (indicator) and trying to assess how the measure would work in practice.

The intangible success factors and measures of Alma Media are presented in Table 21. Only one totally new measure was designed during this project. Other measures already existed in the organization. However, small modifications were made to them during the project.

Table 21. Intangible success factors and measures of Alma Media.

Intangible Success Factors	Performance Measures
Customer satisfaction	Customer relationship questionnaire
	Assessment of relationships with most important customers
Work atmosphere	Employee questionnaire
Employee competencies	Guru ratio (percentage of key competencies possessed)
Education	Workdays per month used for education

Customer satisfaction is measured using two measures which both existed already at the beginning of the project. First, a customer relationship survey is carried out once a year. The survey is carried out using a ‘Customer relationship questionnaire’¹⁶ consisting of fourteen questions. The survey is bought as a service from a commercial service provider. The second measure is the ‘Assessment of relationships with most important customers’. Important customers consist of large customers and also customers that are otherwise important, e.g. “opinion leaders”. The assessment is based on the telephone interviewing of the ten most important customers. The assessment takes place in the monthly meetings of the Customership Team. In addition, the evaluation is done at the level of projects. The customer relationship of the most important customers is assessed on a scale of four to ten, which is the scale used in Finnish schools. The results are further classified into three groups: 4 - 6 ½ equals ‘unhappy customer’, 7 - 8 equals ‘ok customer’ and 8 ½ - 10 equals ‘happy customer’. The difference between the two measures is that the questionnaire takes into account all customers, while the evaluation focuses on the most important customers and provides information more often.

¹⁶ The names of the performance measures are written in quotation marks (e.g. ‘Employee questionnaire’).

At the beginning of the project, there already existed a measure of *Work atmosphere*. The measure is the 'Employee questionnaire' that is sent to the entire business division to which the case organization belongs. The survey is carried out once a year. The project group also designed a more compact survey that would be specifically targeted for the business unit. It would have been carried out monthly to provide more real-time and specific information than the division's survey. However, the implementation of the additional employee survey was postponed because of the overlapping with the survey of the business division.

A new measure called 'Guru ratio' was designed to measure *Employee competencies*. The measure is based on the competency matrix. The matrix is a tool for assessing the competencies of employees regarding certain skills. Each employee's competencies are evaluated during the semi-annual employee-manager development discussion. The competencies of each employee are evaluated on the following scale: 0) employee has no knowledge about this issue, 1) employee has basic know-how, 2) employee has applied the knowledge personally and 3) employee is an expert, i.e. a guru. Two different competency profiles of employees, 1) technical and graphic role and 2) customer service role, were identified. Thus, two different guru measures were designed. The first measure includes technical and graphic skills, e.g. telecommunication, networks, programming languages, databases etc. The second measure includes skills related to, e.g., project management, stakeholder relationships, immaterial properties and budgeting. In both groups, eight skills were chosen as critical, which means that at least two employees should possess the skills of a guru in that area. The performance measure, i.e. 'Guru ratio', is the percentage of the key competencies satisfying the criteria of two gurus. The formula is calculated as follows:

$$\text{Guru ratio} = \frac{\text{number of key competencies which have at least two gurus}}{\text{number of key competencies (8)}}$$

Since competencies are an important success factor for the organization, continuous education is a way to sustain, increase and update them. *Education* is measured as 'Workdays per month used for education'. Education consists of formal courses and education as well as self-education and guidance given by colleagues. The data is collected from the work time reports and the results are reported monthly. This measure also existed at the beginning of the project.

7.1.2 *Technology Industries of Finland*

A team consisting of two persons from the two organizational groups participating and three researchers carried out the project. The measures were designed during six meetings that usually lasted two to three hours each. In addition, some work was done in between the meetings by both researchers and the personnel of the case organization.

In the first group session, the need for measurement was considered from different points of view. First, the issues affecting stakeholder satisfaction and contribution were discussed (the Performance Prism approach). This resulted in a prioritised list of the organization's stakeholders, both internal and external, including the key factors affecting the satisfaction and contribution of each stakeholder. Second, the typical factors of a successful development project were discussed. This was considered important from the point of view of everyday operations since the main way of operating is project work. This resulted in another set of success factors. Third, the members of the team considered the situations in which there has been or would be a need for measurement information. Some of them were the same that had been identified during the two earlier phases. However, also some new factors came up.

Based on the results of the first group session, the preliminary measurement perspectives were decided. The next two group sessions involved considering and specifying the success factors related to each measurement perspective. In the fourth and fifth group sessions, the success factors were more carefully selected and defined. After the fourth session, the intangible success factors included *Quality of organization's services, Customer learning, Quality of consultants work, Employee learning, Knowledge sharing, Development of employees' work methods, Employee atmosphere, Fluency of decision-making processes* and *Efficient use of employees' time*.

The designing of performance measures also started during the fourth and fifth group session. After the fifth session, almost all of the measures were designed. The biggest problems concerned the measures related to employees. It was considered quite difficult to determine either sensible factors to measure or sensible measures, depending on the situation. In the sixth group session, the measures were further defined. This included, e.g., designing the data collection methods and reporting frequencies.

Choosing success factors and designing their measures was an iterative process. The success factors were mainly chosen and defined first, and the measures defined afterwards. However, on some occasions, success factors were later deleted because no sound measures could be designed. *Knowledge sharing* was considered too complicated to measure in relation to the perceived benefits. *Development of employees' work methods* was integrated with *Employee learning* since they were considered overlapping. In the later stages, it was also considered that *Fluency of decision-making processes* was ultimately not important enough to be measured. The most critical reasons for choosing to measure a particular success factor seemed to be both the perceived importance of receiving information regarding the factor as well as the soundness of the performance measurement process.

At the beginning of the project, there were hardly any measures of intangible success factors in the case organization. Thus, none of the new measures were chosen solely on the basis that they were already available. However, in many cases the final versions of the measures were the ones that were the most practical to carry out. For example, the data for two measures was designed to be collected using a customer survey because it was carried out anyway. This offered a practical means for obtaining the measurement data. In general, the more concrete and objective the measures were, the more practical the measurement process was considered.

The intangible success factors and performance measures of Technology Industries of Finland are presented in Table 22. *Quality of organization's services* is measured using a questionnaire sent to customers. The measurement is carried out after each project. The questionnaire is sent to each customer organization participating in the project. Because customers judge the quality of the organization's work, it was considered important to obtain the views of the customers. This was the main reason for using a survey. In addition, there was already a customer satisfaction questionnaire in use. It was quite easy to use in formulating a performance measure. The measure is calculated as a mean of certain questions regarding the quality of services from the customer's point of view. *Customer's learning during project* was measured in the same way. This success factor was considered relevant because it describes the effects of the development projects organised by the case organization from one important point of view.

Table 22. Intangible success factors and measures of Technology Industries of Finland.

Intangible Success Factors	Performance Measures
Quality of organization's services	Customer questionnaire
Quality of consultant's work	Assessment by project managers
Work atmosphere	Employee questionnaire
Customer's learning during project	Customer questionnaire
Efficient use of employees' time	Time used on project ideas that are not realized
Increasing competencies	Percentage of employees who have reached personal development goals
Improving risk management	Percentage of projects using the risk management tool

Quality of the work of consultants is considered as very important because a consultant is a representative of the case organization to customers. The data for the measure of *Quality of consultant's work* is collected using an assessment form. The project managers fill in the assessment form at the end of each project. The form consists of questions that concern the most important factors of consultants' performance. The questions are rated based on a scale which transforms the assessments into quantitative values.

The measurement system includes performance measures of three employee-related intangible success factors. *Work atmosphere* is measured using 'Employee questionnaire'. It was considered that employees could themselves best describe their own work atmosphere. Therefore, a subjective measure was chosen. The survey is carried out once a year. *Efficient use of employees' time* is a success factor that refers to how efficiently employee competencies, an important asset, are oriented towards valuable activities. The measure is formed by calculating the time that is used on project ideas that are not realized. This time is wasted from the point of view of transforming employees' competencies into revenue. The measure is calculated every six months.

Increasing competencies was considered a difficult factor to measure as a general property of several employees. This is caused by the fact that almost all employees have different, personal development goals. This suggests that the measure should include the same number of different measurement criteria. Using the employee-manager development discussions as the basis for measurement offers a compromise: It takes into account the variations in the employees' development targets and transforms the results into a single measurement result.

The data for the measure is collected during the annual discussions between a manager and an employee regarding the employees' personal development plan for the following year. In the meeting, the results of the previous year are evaluated on the basis of mutually agreed development goals. The measure is 'Percentage of employees who have reached their personal development goals'.

Finally, the factor *Improving risk management* is measured as the percentage of projects using a certain risk management tool. A new risk management tool was intended to be implemented in the organization. The measure was designed for supporting the implementation of the tool, i.e. the measure will be used only temporarily until the implementation is completed. There was ambiguity regarding when the implementation of the tool would begin and whether it would be implemented for the whole organization. Thus, the implementation of the measure depends on the decisions regarding the implementation of the risk management tool.

7.1.3 *Work Efficiency Institute*

A team consisting of two researchers and five members of the case organization, both managers and employees, carried out the designing of the measurement system. The team had six meetings in which success factors were chosen and measures designed. The measurement system project was also presented and discussed twice in a meeting of the organization's executive team. In addition to these, a group session was held in each of the three research departments. During the sessions, all employees had a chance to participate in designing the measurement system.

The guiding framework in the measurement system design project was Leinonen's (2001) model. However, the model was adapted regarding various phases to suit the needs of this particular project. Choosing critical success factors was addressed using three means. First, the official documents regarding the strategy were examined. They consisted of quite general strategic objectives, e.g. internationalisation of activities and developing personnel. Second, the manager and the employees of each department discussed the strategic as well as other development objectives of the department in a meeting that was held in each of the three research departments. In addition, the key stakeholders of the departments were

discussed during the meetings. As a result of analysing the discussions of the three departments, ten success factors of the research departments were obtained: *Sharing knowledge*, *Increasing competencies*, *Financial success*, *Efficient operations*, *Employee welfare*, *Customer satisfaction*, *Increasing internationalisation*, *External networking*, *Cooperation between departments* and *Good image*. Third, the organization's strategy and the success factors proposed by the personnel of the departments were further analysed in the meetings of the project team.

The project team started its work by identifying key stakeholders and then analysing their needs and contribution to the organization. As a conclusion of discussing the stakeholders' needs and contribution, the success factors identified by the personnel of the research departments and the strategy of the whole organization, the critical success factors were identified. Each of the three things – the official documents regarding the strategy, ten success factors of the research departments and the needs and the contribution of the stakeholders – was taken into account. Although different rationalisations were used, it is difficult to clearly define why some factors were selected to be measured while some others were not. The main method in choosing success factors was to make sure that there were success factors equally representing all of the five measurement perspectives that had been determined.

There were some situations in which certain success factors were first chosen to be measured but later deleted or somehow changed. Some changes were carried out to the measurement system in order to reduce overlapping or redundancy in measures. It was first considered that both *Good image* of and *Positive publicity* are important success factors. Later it was decided that it would be sufficient to measure only one of them, in this case *Positive publicity*. It was considered that the factors were so similar that adequate information would be obtained by just one measure. The choice between the two factors was made on the basis that there was already a tool for measuring publicity available. Also the factors *Knowledge sharing between employees* and *Cooperation between research departments* were merged so that only *Knowledge sharing between employees* is measured. It was considered that a good way to share knowledge between employees is to carry out joint projects between departments. Thus, it was satisfactory to measure only one factor. Similarly, the factors *Increasing professional know-how* and *Other skills* were merged into one factor, *Increasing competencies*.

Another type of change was made to the measurement system because one factor was considered too difficult to measure. *Effectiveness of organization's activities* was considered an important factor. However, it was deleted from the measurement system because no sound measure could be designed for measuring it. The third type of modification to the measurement system was that two factors were deleted after reconsidering their importance. These were *Utilizing networks* and *Improving career development possibilities*. Both of them were considered important factors. However, they were ultimately not critical enough to be measured. For example, improving career development possibilities is mainly a matter of management decision. It is not something that can be enhanced by just measuring if policies have not changed.

The performance measures were defined in the third session of the project team. One or more measures were defined for each success factor. The primary criterion in defining measures was validity, i.e. that the measure would represent the factor as fairly and accurately as possible. However, practicality was also an important criterion. On many occasions, existing management structures and tools, e.g. the project evaluation tool, were used for collecting the data for measurement. In these situations, there was no need to design new data collection methods. In addition, the existing management tools and the new performance measures could be connected together. This was considered positive because it would both save resources and provide a connection for the otherwise separate management methods.

The intangible success factors and measures of the Work Efficiency Institute are presented in Table 23. They are presented in the form in which they were after the design phase of the measurement system project. The success factors and measures are described below one by one.

Table 23. Intangible success factors and measures of Work Efficiency Institute.

Intangible Success Factors	Performance Measures
Employee welfare	Employee satisfaction index (questionnaire)
Positive publicity	Organization's visibility in media (number of appearances)
Customer satisfaction, financiers	Percentage of satisfied customers (questionnaire)
Customer satisfaction, users	Percentage of satisfied customers (questionnaire)
Effective distribution of work	Percentage of employees whose workload meets certain criterion
Effective project management	Mean ratio, calculated based on project evaluation form
Sharing knowledge between departments	Number of joint projects between departments
Internationalisation	Number of employees having attended an international occasion
Increasing academic competency	Number of post-graduate credits
	Number of post-graduate degrees
	Number of other degrees
Increasing competencies	Percentage of employees who have reached personal development goals
	Investments in education

The measure of the factor *Employee welfare* is 'Employee satisfaction index'. Because employees represent a key asset for the organization, their welfare is in the interest of the organization. Dissatisfied employees are considered more likely to leave the organization than satisfied employees. *Employee welfare* includes both physical and emotional dimensions. The measure was formed based on the project group's discussion regarding the important variables of employee welfare. The data is collected using a questionnaire with ten questions. These include, e.g., the level of satisfaction regarding the clarity of goals, the responsibility for work, the feedback received and the availability of healthcare services. The measurement scale is a five-point Likert scale. 'Employee satisfaction index' is calculated annually as a mean of all the answers of all respondents.

Positive publicity is measured by 'Organization's visibility in media'. In practice, the result is obtained by calculating the number of times the organization's name is presented in certain media. There is a company that does the survey and reports the information once a month to the organization. The number of appearances in the media is actually not a very valid measure of positive publicity. The measure is not able to distinguish between positive and negative publicity. It only calculates the amount, not quality, of publicity. In order to

measure just the positive publicity, more detailed examination is required. This would require more resources, which in turn could make the measurement too expensive in relation to the benefits resulting from it.

The factor *Customer satisfaction of financiers* refers to the satisfaction of the financiers of the research projects. Satisfying the financiers is important in order to be able to receive new financing for future projects. The performance measure is 'Percentage of satisfied customers' and it is reported once a year. The data is collected using a questionnaire in the concluding meeting after each research project. The questionnaire consists of six questions that are answered either yes or no. The measurement result is calculated by the percentage ratio of yes-answers in relation to all responses. The questions include, e.g., were the results of the project in accordance with the goals, did the project proceed according to plan and was the project successful as a whole? Only the question regarding the successfulness of the whole project is used when calculating the measure. The five other questions provide additional information but are not included in the quantitative measure. It was considered that, unlike the overall successfulness of the whole project, they are not necessary conditions for customer satisfaction.

Customer satisfaction of users of the research results is very important to the organization. The research reports and other publications should consist of information that is relevant and useful to the persons reading them. Thus, customer satisfaction is measured using a questionnaire that is sent attached to the publications. The questionnaire includes both fixed and open questions. The questionnaire consists of three questions regarding usefulness, understandability and accessibility that are answered either yes or no. The measurement result is calculated by the average percentage ratio of yes-answers in relation to all responses. A single percentage is calculated from the results once a year. In addition, the results can be examined regarding each publication.

Effective distribution of work is a factor that was considered important because the workload was distributed unevenly in all three departments. The problem was that only certain employees possessed the skills required for a specific task. Thus, they were the only ones who could do the work. This results in uneven workload between employees. The goal was to balance the workload more in the future. Work time monitoring was already used in the organization. This means that all employees report each month what they have used their

time on. A work time monitoring system was used as the basis of the performance measure. The actual measure is 'Percentage of employees whose workload meets a certain criterion'. The criterion was that 50 - 80 percent of the theoretical work time should be spent on projects. The measure was considered quite practical because an existing tool could be used for data collection. However, the validity of the measure is questionable. The effective distribution of work involves several criteria, e.g. the quality and quantity of inputs and outputs of work in addition to time. Thus, the measure captures only one characteristic of the underlying factor. The choice of time as the dimension to be measured can be rationalized by the fact that the main problems experienced were manifested as differences in the time used for project work.

Effective project management was considered an important factor in everyday work. A project evaluation tool was already in use in the organization. In using the tool, each project is evaluated from different points of view, including finance, organizing and quality. The tool consists of questions that are estimated on a scale of zero to four. Each question is weighted based on its importance in the particular project. A total value for each project is obtained as a result of the evaluation. Because there are projects of different sizes, the results cannot be directly summed up to represent the general situation. Instead, they are first weighted using the total work years used for the project. Finally, a performance measure describing the general situation of the project management is formed as a mean ratio that is calculated based on the weighted results of the project evaluation tool. The result of this general measure is reported once a year. However, the project evaluation tool itself is applied constantly for all projects.

Knowledge sharing between employees was considered to work well in a team carrying out a common research project. It was also considered that currently only little knowledge transfer occurs between departments. A future goal is to increase knowledge transfer between departments. Thus, a practical way of increasing knowledge transfer is to increase the number of joint projects. Therefore, *Sharing knowledge between departments* is measured as 'Number of joint projects between departments'. Both the number and the monetary volume of joint projects are examined. The measurement is carried out once a year and the data are collected from administrative documents. Measuring both the number and the monetary value was considered to be informative because of the different types of projects. In this case, the performance measure does not actually describe the knowledge-

sharing activity at all. However, it describes a factor that is considered to be a necessary condition for knowledge sharing. In addition, knowledge sharing itself was considered very difficult to measure in practice.

One common goal for the whole organization is to increase its activities abroad and become more well-known internationally. This is intended to be accomplished, e.g., by participating in international research projects. *Internationalisation* of activities is measured by the number of employees having attended an international occasion during a year. Data is collected once a year by asking employees to report their international activities. An international occasion was defined as international conferences, meetings and study trips. The goal is to get as many of the researchers as possible to attend these international occasions. Therefore, measuring the number of employees was considered to focus the attention on all employees. Measuring the number of attendances at international occasions would have showed high numbers because certain individuals are very active. However, it would not have revealed the extent of all employees' international activities.

Increasing academic competency was considered important for all employees because they must be competent in order to carry out the challenging research projects. In addition, the financiers of the projects appreciate formal education and academic degrees. The employees of the organization are on different academic levels. Some are pursuing post-graduate degrees, some master's degrees and some have already finished their degrees. Thus, three performance measures were designed so as to take account of the differences. The measures are 'Number of post-graduate credits', 'Number of post-graduate degrees' and 'Number of other degrees'. The measurement is carried out once a year and the data are collected during the annual development discussions between manager and employee.

In addition to academic competencies, employees need various other skills. These include skills related to, e.g., information technology, foreign languages, communication, presentation, business and project management. Development goals vary between employees, which makes them difficult to measure. *Increasing competencies* is measured using the annual development discussions between manager and employee as the basis for measurement. Each employee's individual development goals for the following year are agreed and the results of the past year are reviewed in the meeting. The performance measure is 'Percentage of employees who have reached their personal development goals'.

In addition, the organization's 'Investments in education' are also measured once a year. Even though the measure is not a valid measure of employees' competencies, it shows the organization's willingness to invest in increasing employees' competencies. In addition, the measurement is very cheap to carry out because the data exists anyway in the financial statement.

7.2 Implementation of Measures

7.2.1 Alma Media

The first meeting regarding the implementation of measures was held almost three months after the measures were first designed. At that point, hardly any work had been done on implementing the measures. The everyday activities had taken the time from the measurement project. It was decided that the project team would convene after five months when the implementation would likely have been carried out. However, after the five months the meeting was again rescheduled for later. This was caused by the lack of time and problems with the reporting tool that was being developed simultaneously with the measurement system. Despite these problems, the measures had been implemented during the five months. Thus, in order to save the time of the employees of the case organization but still gain information about the implementation, an interview was conducted via e-mail. The case organization's contact person in the measurement project answered questions via e-mail correspondence. To provide additional information, the actual implementation meeting was held one and a half months later, i.e. a little over ten months after the design phase. It was attended by the same three researchers and four persons from the case company who also participated in most of the design meetings. The implementation-related issues discussed below represent the situation about ten months after the design phase.

Customer satisfaction is measured using the two measures as planned. The customer relationship survey, i.e. the questionnaire, is carried out as before, using an external service provider. Using the survey has produced concrete improvements through reacting to the development ideas suggested by customers. Also 'Assessment of the relationships with the most important customers' is carried out as before.

The existing 'Employee questionnaire' that is sent to the entire business division was decided to be continued similarly as in the previous year. However, the individual questions had been slightly updated after the design phase. The next survey was to be executed in a few days and its results were to be presented one month after that. A big need for the employee survey was experienced since some organizational changes had been made. In the early design phase, it had been decided that a question regarding the flow of information would be included in the personnel survey. In fact, the questionnaire consists of several questions that examine the flow of information from several perspectives, e.g. the information flow between different business units and different employees. In addition, other activities had been carried out in order to improve the flow of information in the organization. These activities include launching the company's internal newsletter and a new policy of e-mailing memos of various team meetings for each employee of the business unit.

The measure of *Competencies*, i.e. 'Guru ratio', had been implemented. The competency matrix had been updated before the employee-manager development discussions. Based on that, the results had been calculated once. In addition, the competencies in the matrix had been slightly updated. The measure of *Education* was already in place at the beginning of the project. Thus, it did not have to be implemented. It is measured and the results reviewed monthly as before.

During the implementation phase a need had arisen to monitor the internal mistakes of the organization. The internal mistakes are "close calls" that have not caused any problems to customers but potentially could have. A circulating trophy is given for these mistakes. The aim is not to give negative attention to the person responsible for the mistake. Instead, it is intended as a positive reward for discovering an internal mistake and to support learning from them. Therefore, instead of designing a performance measure of these mistakes, a process for handling the issue has been designed.

The main purpose of the measurement project was to support the organization's knowledge and competency development activities. Simultaneously with the measures design project, also other knowledge and competency development activities have been implemented in operations. For example, competency development is a topic in the employee-manager development discussions which has not been used previously. Another related realization of

the representative's of the case organization was that performance measures do not have to be formal, i.e. they do not have to be in some specific format such as a percentage etc. They may be, e.g., qualitative assessments.

Because of the general rush in everyday work, there was a lack of time to concentrate on development issues such as performance measurement. This caused the situation that some of the issues discussed during the measures design project were forgotten and not paid attention to in everyday work (between meetings related to measurement). A related concern has been that fast changes in operational environment may cause problems in using the measure. For example, at the time when the previous employee-manager development discussions were carried out, a certain new education course was not yet available. This kind of new possibility affects the realization of the decisions and objectives agreed on in the development discussions.

In the Alma Media case, only one totally new measure was developed. Other measures existed already at the beginning of the project. Only a small amount of further development was carried out for those measures. Thus, the implementation phase succeeded with few problems. The case company's representatives identified the *use* of performance measurement as the next big challenge. They have discussed how to translate measurement results into managerial conclusions and how the measures can be used to motivate and reward employees.

7.2.2 Technology Industries of Finland

A little over four and a half months after the last design session, a meeting was held to see how the implementation had succeeded. This was considered adequate time for implementing the measures. However, one of the two groups had done hardly any work on implementing the measures. Thus, they did not participate in the meeting, which had to be rescheduled for later on their part. According to the manager of the group, the main reason for the slow pace of implementation was that a key employee whose responsibility the measurement project was had left the organization. The leaving of the employee had led to prioritising other issues over the implementation of measures.

Because only the other group's measures implementation had advanced as planned, the following discussion focuses only on that group. Two researchers and the same two persons from the case company who participated in the design meetings also attended the two-hour implementation meeting. In addition, some issues were discussed by e-mail after the meeting.

As planned, certain modifications were made to the existing 'Customer questionnaire' in order to provide the necessary information for the measures of *Quality of organization's services* and *Customer's learning during project*. In fact, the factor *Customer's learning during project* was further refined to *Change in customer's operations*. It was considered that learning is not enough; also some changes in the ways of operating should occur. *Quality of organization's services* is measured using three questions and, similarly, *Change in customer's operations* using three questions. The survey is carried out at the end of each project. An external consultant carries out the surveys. They are conducted using telephone interviews of about fifteen minutes. The first surveys had already been carried out. One lesson learned so far is that the open questions had been especially helpful. The results are collected on a spreadsheet that includes the results of each question regarding each project, the mean results of all projects and the mean results of the projects of a certain project manager. It was considered informative to examine the results in this manner. In addition, the intended performance measures, i.e. the means of all answers, are examined annually in order to see the development of the results.

Work atmosphere of the entire organization is measured annually using a questionnaire. During the measurement project, it was discussed whether to design a new questionnaire that would be shorter and that could, thus, be used more often. Ultimately, it was decided that the whole organization's survey would be adequate. In addition, work atmosphere is one topic of the employee-manager development discussions.

Quality of consultant's work was designed to be measured using an assessment form based measure. However, the assessment form was not yet completed. It had been decided that the form would be designed during the next few months. The discussions regarding the issue of the quality of consultants' work have also led to recognizing the need to set the criteria for choosing consultants. This new tool is under preparation.

Efficient use of employees' time is measured roughly as planned. An existing work time management tool was slightly changed so that it would provide the information needed. An additional time dimension, the time used on designing a new project, was added to the original tool. This way it is possible to determine also the time used on project ideas that are not realized. Both the calendar time and the work hours used are measured. There had been discussions on accounting problems regarding project ideas that, for some reason, do not start as projects but later are restarted. It was decided that the problems are solved as they occur. Finally, it had been considered that the time management tool would also be a practical and informative tool for reporting. Thus, there was no need to extract some information to a specific performance measurement scorecard. Rather it was considered more practical to be able to observe the various work time related issues simultaneously on the time management tool. The measurement information was going to be used in designing new projects and assessing when the design of a certain project idea should be stopped.

Increasing competencies was designed to be measured using the employee-manager development discussions. At the moment, the development discussions are held annually. The aim is to increase that amount up to two discussions per year in the future. The performance measure was considered difficult. Therefore, it had been discussed whether to examine the development of individual competencies only qualitatively in the development discussions without transforming their results into a quantitative measurement result. The final decision had not yet been made.

Improving risk management was originally considered to be measured via the new risk management tool. This measure was discarded because the implementation of the tool itself was still uncertain. In addition, it had been noticed that risk management was an issue that required actions in order to be managed and developed – simply measuring it would not result in desired outcomes. Therefore, a new risk assessment tool was developed. The tool is a form that includes a list of various types of risks that are possible in projects. Using the form, the risks related to each project are analysed at the beginning of each project.

The measurement results will be examined in the annual development discussions. They will also be discussed in the monthly meetings of the department as the measurement-related issues arise, e.g. when there are new measurement results.

General comments regarding the implementation phase included the following statements. First, there was experienced no need to collect the measurement information on a single scorecard. The various issues, e.g. customer survey and time management, can be practically examined as separate documents. Second, from the point of view of a successful implementation of the measures, it was necessary to create applicable data collection methods and tools (e.g. a customer survey and time management tool).

Four out of the seven measures that were originally designed had been implemented roughly as planned. One measure was deleted and two were still waiting to be implemented. This was the situation a little over four and a half months after the design phase had been finished and roughly eleven months after starting the project at the department in which the work had proceeded best.

The implementation of the two measures that had not yet been implemented was inquired again six months later by email. At that time, the two measures still had not been implemented. The assessment form had been completed that would provide the data for the measure of *Quality of consultant's work*. However, it had not yet been taken into use. Instead of using the measure of *Increasing competencies*, they had decided to wait for a competency survey that was intended to be used in the whole organization.

7.2.3 *Work Efficiency Institute*

Two meetings were held at the Work Efficiency Institute regarding the implementation of the measures. The same group that designed the measures also participated in these meetings. Four months after the last measures design meeting the first meeting was held to see how the implementation had succeeded. At that time only a little work had been done to implement the performance measures. According to the case organization's personnel, this was mainly due to the lack of time, i.e. other tasks were considered more important at that point than the performance measures.

After four months, the measures were not yet in use. Regarding certain measures it was even considered whether to implement them at all. Some of the personnel questioned the usefulness of the measures. Generally, there were still certain unclear issues regarding the

measures. The practical use of the measures, i.e. what to do with the measurement results, and reporting related issues had not yet been decided. However, some work had been done on the measures. Results of some measures had already been collected. In addition, the properties of certain measures had been discussed and further analysed. First, the cost of the media survey, i.e. the visibility of the Work Efficiency Institute in media, was considered quite high. Therefore, alternative methods had been discussed. Second, the employee-manager development discussion based measure was considered problematic since it takes a lot of time to get the first measurement result. One round of annual discussions has to be carried out first in order to set the individual goals. The measurement result is obtained only after the second round of annual discussions.

Since the implementation had not proceeded as expected, another meeting was held three and a half months after the previous meeting. During the time between the first and the second meeting, work had been done on further specifying measures, i.e. determining reporting responsibilities and setting goals, and also on collecting data and calculating results of many measures. However, some measures were still not yet implemented. Also a specific meeting of the executive group of the Work Efficiency Institute had been held regarding the performance measures. The implementation had advanced at different speeds in the three departments. One department had been clearly more active than the two other departments. This seemed to be mainly caused by the active role of the manager of the first department, who had also initiated the entire measurement project in the first place.

The implementation of the measures of *Effective distribution of work*, *Effective project management*, *Sharing knowledge between departments* and *Internationalisation* had succeeded as planned and the first sets of measurement data had already been collected. However, there were some problems in measuring the other factors. It had been decided that the measure of *Employee welfare* would not be implemented, at least not yet. Even though the factor was considered important, measuring it was not considered to have a high priority. The measure may be implemented later if a need for the information arises. The measurement of *Positive publicity* was still under consideration because of the same problems with the costs that were described earlier. It had been noticed that in addition to the high cost of the service itself, also additional costs are incurred because of the need to further handle the information for reporting, e.g. assigning publicity numbers to departments. For the time being, the current method will still be used.

Neither of the customer satisfaction surveys had yet been implemented. A ‘Customer satisfaction questionnaire for financiers’ was going to be used when a suitable situation would occur. The implementation of a ‘Customer satisfaction questionnaire for users’ was about to start in the near future. Certain procedures had already been designed so that the questionnaire form is printed and attached along with the return envelope for the publications while the publication is being printed and bound.

There had been some modifications and discussions regarding the measures of *Increasing academic competency*. The measures ‘Number of post-graduate degrees’ and ‘Number of post-graduate credits’ had been implemented as planned. Some discussion was carried out in the meeting regarding the problems of target setting regarding post-graduate credits. It was considered difficult to set a target that would be in balance between working fulltime and studying to improve one’s competencies. Ultimately, it was managed to set a reasonable target level. The measure ‘Number of other degrees’ had been deleted. There was some discussion regarding the reasons for deleting the measure. No explicit answer was provided, but the reasons related to the difficulty of defining the “other degrees” and to the fact that other than post-graduate education could also be measured in the employee-manager development discussions.

Increasing competencies was intended to be measured using the employee-manager development discussions. However, the discussions had not been carried out yet. There was some hesitation and questioning whether it would be possible to set targets that are explicit enough to make the comparisons required. It was considered that the individual development targets are usually so inexact that comparison might be difficult. However, it seems to be possible to take this into account when setting the targets. The other measure of *Increasing competencies* is the annual ‘Investments on education’. Data source and the responsibility for collecting the data had been determined. However, the measurement data had not yet been collected.

Based on the experiences of the implementation phase, the Work Efficiency Institute’s representatives in the meeting made the following general comments regarding the implementation of the measures. First, the practical handling of the data needed for the measures was considered somewhat laborious and complicated. Second, the measures for

which data collection methods did not previously exist are especially troublesome. Third, the usefulness of the measures is impossible to fully determine yet because there is no practical experience of using the measures. In addition, they had also come to the conclusion that in an expert organization, such as their own organization, it is unnecessary to present the measurement information in a simplified format (i.e. indicators collected on a scorecard). The experts wish to study the measurement information in documents that provide more information than just the single measurement result. For example, examining all the results of a questionnaire is more informative than examining just a single index or a few indices.

Only seven out of the thirteen measures that were originally designed had been implemented as planned. One measure was deleted, one was postponed until a greater need for measuring would arise and four were still waiting to be implemented. This was the situation about seven and a half months after the design phase had been finished and roughly one year after starting the project at the department in which the work had proceeded best. The other two departments were even slightly behind.

The implementation of the four measures that had not yet been implemented was inquired about again by email a little less than six months later. The implementation had proceeded somewhat regarding three measures. However, the measure of *Customer satisfaction of the financiers* had not yet been implemented because no suitable projects had ended so that the measure could have been tested. The customer satisfaction questionnaire for the users of the research had been used once. Only few had responded to the questionnaire. Therefore, it had been decided to change the method for targeting the customers. The implementation of both measures of *Increasing competencies* was still unfinished. A new round of the development discussions between managers and employees was currently on the way. 'Investments in education' had been assigned a cost centre which will later provide the information for the measure. It was decided to be set target values in the fall while designing the budget.

7.3 Use of measures of intangible success factors – interviews

7.3.1 Alma Media

The results of the ‘Customer relationship questionnaire’ have been reviewed in a planning meeting of the whole personnel, by various teams, especially the Leadership and Customership teams, and in an education event for the persons responsible for customers. The activities carried out based on the results of the questionnaire include group activities, a communications plan and communication, e.g. in the extranet, customer education for the whole personnel and especially for the persons responsible for customers and developing the process for customership. The questionnaire is experienced as “extremely important”. Especially the open questions provide important information. They also consider that the customers are sincerely attempting to develop the way the organization operates. Customers have proposed concrete development ideas.

‘Assessment of the relationship with most important customers’ has been examined by the project group that the measurement concerns, in meetings of Leadership and Customership teams and in development discussions between an employee and a manager. The measurement results have been used in developing the process for customership, guiding persons responsible for customers and replacing the persons participating in a project. This measure is considered important and is under further development. Especially the persons responsible for customers consider it an important tool for developing their own work.

The results of the ‘Employee questionnaire’ were reported to the whole personnel using a group email. In addition, the results have been presented in a personnel magazine and bulletin. The results have been used in various meetings of teams and the business unit and in the development discussions between employee and manager. Each part of the questionnaire that for some reason has required reacting has been processed in the Leadership Team. The activities based on the results have included organizational changes, increasing communication, organizing theme days and personal discussions and further developing business processes and the guidance given to personnel. Employee satisfaction is experienced as a strategically relevant issue. However, the questionnaire has some problems: it produces too good results. This leads to not finding any room for improvement. There have been discussions about creating a new employee questionnaire which would

focus more deeper into team level. It is hoped that this would provide more accurate information on some issues, e.g. professional competence, motivation and working conditions. A positive aspect of the present questionnaire is that the answer ratio has been around ninety percent, which is quite high.

The ‘Guru ratio’ has been reviewed in the development discussions between employee and manager, in strategy meetings and in discussions of the Leadership Team. The results have been used for designing education, recruiting and supporting self-studying. The measure is experienced as “vital” for the organization.

The measure of ‘Education’ has not been used as actively as the other measures. It was considered an almost forgotten measure. It has been used in some strategy meetings. The measurement results have lead to radically increasing education and to targeting and planning education more carefully. The quantitative education objective has been easy to achieve. However, the quality of the education has been considered more important than its quantity.

7.3.2 *Technology Industries of Finland*

The performance measures of two factors, *Quality of consultant’s work* and *Increasing competencies*, had not still been implemented after one and a half years after starting the project. Thus, they cannot be discussed in this context.

The results of the measures of *Quality of organization’s services* and *Change in customer’s operations* are presented on a spreadsheet regarding each project. The results have been reviewed in the discussions between the group manager and project managers. The results have been taken into account in following projects and in designing guidelines. These measures are considered to work fine. Especially the open questions have been considered informative.

Work atmosphere has been examined in the development discussions between employee and manager. So far this has not resulted in any specific activities. ‘Time used on project ideas that are not realized’ has been considered in the discussions between the group manager and

project managers. The measure has led to abandoning one project idea. A problem has arisen regarding the measure: there are a lot of project ideas that should be taken into account. This has delayed the implementation of the measure.

7.3.3 *Work Efficiency Institute*

The implementation was incomplete regarding both measures of *Customer satisfaction* (of both financiers and users) and both measures of *Increasing competencies*. The discussion about using the measures is thus limited to those measures that have already been used.

The whole measurement system has been reviewed in the meeting of the executive team. Measurement results have not been discussed in the meeting. Next, the measurement system will be examined in all three research departments. The results and objectives will be discussed in those meetings. In addition, many of the measures are taken into account when designing the budget and the action plan for the following year.

The measure of *Positive publicity* has been used only sporadically. It has been discussed in the meeting of the management group. So far it has not resulted in any actions. There have been problems in setting objectives for the measure. It is possible that this measure will be somehow developed.

Only one department, household economy, has used the measure of *Effective distribution of work*. The measure has been reviewed in a meeting of the management team of the department. The results have been used to allocate work more evenly. The value of the measure is that it indicates possible problems and guides towards a more specific examination of the issue.

Also the measure of *Effective project management* is currently used only at the department of household economy. All the projects carried out at the department are evaluated one by one. The evaluation has led to reminding project workers about the principles of project management and it has been used as a basis for trying to develop more effective practices. The measure is experienced as good at this stage.

The measure 'Number of joint projects between departments' has not yet been used actively. However, the management group has recently set up two different teams for improving knowledge sharing between departments. Also meetings regarding co-operation have been held between the education and research activities of the organization. The measure is experienced as good at this stage.

The measure of *Internationalisation* has also not been used systematically and it has not yet lead to any actions. The purpose of the measure is to ensure that all employees gain international experience. The measure is experienced as good at this stage.

The two measures of *Academic competency* have been used to set personal plans in the development discussions between employee and manager. 'Number of post-graduate degrees' has been considered problematic because a post-graduate degree is so big a measurement unit. This is a problem because, in a certain year, there may be one or few new degrees, or there may not be any. The measure 'Number of post-graduate credits' does not have the same problem because it measures the progress of the post-graduate degree in smaller steps. This measure is considered a good beginning but may need improvement later on.

As mentioned, the measures of *Increasing competencies* had not yet been completely implemented. The development discussions between employee and manager were currently on the way. The objectives set last year are compared to the realized development. Although the measure is not yet fully in use, it has caused discussion about how much each department needs education. Thus, the measure is considered a good beginning. Similarly, 'Investments in education', although not yet in use, has caused the setting of objectives for each department regarding annual investments in education. This measure has the weakness that it gives only partial information about the amount of investment in education. Part of education is carried out within projects. The measure does not capture this part of the investment.

7.4 Use of measures of intangible success factors – focus group

The discussion in the focus group was organized around six topics. The results of the focus group are described here and the comments are grouped according to these six topics. It should be noted that all the comments presented represent the views of the interviewees, unless stated otherwise.

What mistakes have been made in designing and implementing the measures?

At Alma Media the process of designing and implementing the measures was experienced as fine in itself. However, problems experienced with the reporting tool almost caused the whole project to fail. The measurement project at Technology Industries of Finland was successful in creating good measures for factors related to describing the activities of the organization. However, the measures of the effectiveness of the organization's actions still need further improvement. The Work Efficiency Institute's measurement project was carried out without any specific mistakes. However, some measures are still not finished, some are difficult to maintain and some provide data that do not describe very well the factor being measured. They recognized the trade-off in designing measures: a good measure is difficult to design and implement and, vice versa, a measure that is very practical may not be as good.

What are the biggest problems in carrying out the measurements and in using the measures?

There were no big problems in carrying out the measurements and in using the measures at Alma Media. However, some issues had caused discussion and concern. First, the role of the person in charge of the measure is important. He or she should be responsible for analysing and communicating the results, not just collecting the information. Second, different people are interested in different measures. If a measure is useful for someone, it is worth measuring. Third, they have been concerned about being able to actually use the measures, i.e. that the measures affect the activities in the organization.

Technology Industries of Finland have experienced two main problems. First, a certain group of employees that work hard and receive good but not excellent results may feel that it is impossible for them to improve their work. Thus, instead of motivating, measurement may cause frustration. Second, they have experienced that interpreting measurement results

of a questionnaire on a one-to-five scale is difficult. It was considered that it might be hazardous to focus only on numbers. Qualitative information gives valuable additional information which helps to gain an overall picture. The quantitative results may be affected by certain individual events.

Subjective measures have caused some discussions at the Work Efficiency Institute. On the one hand, subjectivity, i.e. how employees or customers experience things, is important as such. However, the relationship between, e.g., the experienced work atmosphere and the actual, objective atmosphere is not clear. This means that, even if the actual work atmosphere is better than in most organizations, the employees might still complain that the working atmosphere is poor. The interviewees felt that the level of subjective measurement results should resemble objective reality.

What (types of) measures are most useful?

The measures that were experienced as most useful at Alma Media were the measures that describe the present situation of the organization's activities. This refers to measures of, e.g., customer satisfaction and quality of operations. It is easy to discuss these practical issues with other employees. For example, some financial measures may be experienced as too abstract by employees. Technology Industries of Finland had no comment at this stage, but earlier they commented that they had been successful in creating good measures for factors related to describing the activities of the organization. Also, at the Work Efficiency Institute the most useful measures are those describing current activities in the organization. These measures are related to customers and to developing their own work. They are easy to relate to what each employee is doing. They provide the most interesting, useful and timely information. Both qualitative and quantitative measurement information is experienced as useful.

What (types of) measures are the least useful?

At Alma Media, there were conflicting views about this issue. The measure of *Monthly visitors to various Internet sites*¹⁷ was considered as impractical because the employee cannot directly affect the result of the measure. However, others considered the measure important from the point of view of communication. Technology Industries of Finland had no comment at this stage, but earlier they commented that they have not been very successful in creating good measures of the effectiveness of the organization's actions. The Work Efficiency Institute had one measure, 'Organization's visibility in the media', which was considered quite poor. The service providing the data is expensive, the data needs further processing, it is unclear what the result actually means and it does not guide activities. On a general level, it was considered that the usefulness of the measures is difficult to assess because it depends on the user. For example, different issues are important at different levels of the organization. In addition, there should be more experience of using the measures before the assessment of the usefulness can be made.

How well the measures meet the requirements set at the beginning of the project (how good the measures are in practice)?

At the company level, the measures of Alma Media were considered to be working fine. They are such that they can be duplicated for other parts of the organization. This will be done in the near future. However, Alma Media's measurement system includes no measures at the level of teams. There have been discussions about whether to extend measurement also to the level of teams. Currently the competency matrix (that provides information for one measure) is under further development which, however, does not actually relate to the measure itself.

The measures at Technology Industries of Finland were considered to work well at the level of projects. However, the same measures cannot be used in other parts of the organization where no projects are carried out. The effectiveness of the measures is expected to be determined later based on experience regarding the use of the measures. It seems quite

¹⁷ This measure existed already at the beginning of the project. It describes the volume of some of the organization's services. It was considered a typical tangible factor and, thus, it has not been discussed earlier. It is presented here because the discussion serves as an example of the difficulty of assessing the usefulness of a measure.

possible that new requirements will come up as time goes on. Then, new measures may need to be designed.

The measurements system as a whole meets the requirements at the Work Efficiency Institute. One problem, not related to the functioning of the measures as such, is how to set reasonable objectives. Another concern regarding the measures is whether they actually will be used to guide actions.

How should the measurement system and / or the measures be further developed in order to better meet the needs of the users of the performance information?

The reliability of one measure, 'Assessment of the relationship between the most important customers', had caused some concern at Alma Media. The measurement information is collected by telephone. It has been discussed whether the customer answers the questions of the survey truthfully or not. It should also be ascertained that all measures are used as a tool for management, i.e. that measuring is not done for the sake of measuring.

At Technology Industries of Finland, there had been discussions about how often the questionnaire surveys should be carried out. For example, one certain group gets almost the same result every time. Because the measurement causes costs, it is reasonable to consider performing the measurement less often.

The Work Efficiency Institute's customer satisfaction measure will be developed such that a new way for targeting the questionnaire for the customers will be implemented. Preliminary testing has shown the current method to be ineffective. At the Work Efficiency Institute, the assessment of cost and effort of measurement in relation to the benefits is intended to be carefully considered. This point especially deals with the measure of positive publicity which was mentioned earlier as problematic. However, the same issue refers to measurement in general: the resources required for measurement must be reasonable.

8 ANALYSIS OF THE RESEARCH MATERIAL

At the beginning of this chapter, the methods of analysing the research material are described. The three following chapters and their subchapters present the analysis of the research material. These chapters provide answers to the research questions. At the end of the chapter, the whole process of measuring intangible success factors is examined.

8.1 Methods of analysis

Because there are different types of objectives in this study, also different analysis methods are used. The objectives regarding how the different phases of measuring intangible success factors are carried out are descriptive. In this type of situation, a descriptive framework for organizing the presentation is appropriate (Yin, 1994, p. 104). Here, the presentation is organized in such a way that the results regarding the three phases of measurement are discussed in the three following chapters. The analysis of the research material is carried out and presented method by method. Because the use of measurement was examined using two methods, the material gained using each method is first analysed separately and then jointly. The material is analysed first within each case and then across the different cases (cf. Eisenhardt, 1989, pp. 539 - 541).

Another type of objective of this study is to identify the challenges in the different phases of measuring intangible success factors. These objectives are explanatory: which issues cause problems in a certain phase? According to Yin (1994, p. 110), the explanation building analysis method aims to identify causal links within the research phenomenon. The explanations should reflect some theoretically significant propositions. In practice, this is carried out by comparing the experiences of the case organizations with earlier research results.

Pattern-matching is yet another specific type of analysis method used. In pattern-matching, empirical results are compared with a predicted pattern (Yin, 1994, p. 104). This is carried out in Chapter 8.5 when the model describing the phases of measurement (see Chapter 5.3.1) is compared against the empirical results of the case studies.

Some issues regarding the research data should be considered before analysing the research material. First, at Alma Media, only a few measures were designed and all measures were based on existing systems. The situation was the opposite in the two other organizations: there were more measures and many of them were not based on any existing system. Second, the Knowledge Audit Cycle was used in Alma Media to identify the factors to be measured. Otherwise the process was similar to that in other cases. Third, the length of the design phase at Technology Industries of Finland seems much longer than in the other cases. However, the difference is not that big in practice. The meeting before the final meeting was held in the same week as the final meeting of the design phase of the Work Efficiency Institute, i.e. only one meeting was held after that. The final meeting could have perhaps been considered an implementation meeting, but implementation was not yet discussed at that time. In comparison, two implementation meetings were held in the two other organizations.

8.2 Designing performance measures of intangible success factors

8.2.1 How were the measures designed?

8.2.1.1 Starting point for the designing

Performance measures of intangible success factors were designed in all organizations to be used as a tool for managing the critical success factors of the organization. The starting point of the design phase was the managerial needs. The design process was specific in each case, i.e. issues of specific interest were considered in each organization. The practice corresponds to the view in the literature (see Chapter 5.2.1). The processes can be considered as using the “needs-led” procedure as described by Bourne et al. (2003, pp. 6 - 7).

A project group consisting of both researchers and personnel of the case organization carried out the process of designing the performance measures in each case. Researchers acted as facilitators of the process. This is quite a typical way to design performance measures (cf. Bourne et al., 2003, pp. 6 - 7). Also employees that were not part of the project group had a chance to participate in the designing. At Alma Media, the personnel participated in the designing of measures during a development day in the course of which

they discussed and designed the performance measures in groups. At the Work Efficiency Institute, the measurement project was discussed in each of the three departments and it was a topic in two meetings of the executive team. According to the Institute of Management Accountants (1998, p. 49), the participation of the personnel is an important factor in the successful design of performance measurement systems.

In the following chapters, five questions regarding the design phase are examined. The questions are the same that have been discussed in Chapter 5.2.1.

8.2.1.2 How were the intangible success factors to be measured chosen?

At Alma Media, the success factors were chosen using the Knowledge Audit Cycle. In practice, the choices were based on identifying the critical competencies and the processes of managing them. A key factor in deciding which success factors to measure was measurability. For example, it was decided not to measure the *Flow of information* because it seemed too difficult (too immaterial) to measure.

Preliminary success factors were first identified at Technology Industries of Finland by discussing the issues affecting stakeholder satisfaction and contribution, the typical factors of a successful development project and the situations in which there has been or would be a need for measurement information. The preliminary success factors were further developed by grouping them according to measurement perspectives.

At the Work Efficiency Institute, the intangible success factors were identified by discussing the stakeholders' needs and contribution, the success factors identified by the personnel of the research departments and the strategy of the whole organization. Choosing a certain factor and abandoning another was often an intuitive decision that was based on group discussions.

In all three cases, the choice of intangible success factors to be measured was based on identifying important factors and then deciding which were important enough to be measured. The process seems very similar to that suggested in the normative literature (see Chapter 5.2.1). Choosing success factors and defining their measures was an iterative process in all three cases. The success factors were mainly chosen and defined first, and the measures defined afterwards. However, on some occasions, certain success factors were

first chosen to be measured but later deleted or somehow changed. Also iteration is typical in designing performance measures (cf. Bourne et al., 2000, p. 758; Kaydos, 1999, p. 192).

Some changes were carried out on the measurement systems during designing in order to reduce overlapping or redundancy in measures. At Technology Industries of Finland, *Development of employees' work methods* was integrated with *Increasing competencies* since they were considered overlapping. At the Work Efficiency Institute, it was first considered that both *Image of the organization* and *Positive publicity* are important success factors. Later it was decided that it would be sufficient to measure only one of them, in this case *Positive publicity*. It was considered that the factors were so similar that adequate information would be obtained by just one measure. The choice between the two factors was made on the basis that there was already a tool available for measuring publicity. Also the factors *Knowledge sharing between employees* and *Co-operation between research departments* were merged so that only the *Co-operation between departments* is measured. It was considered that a good way to share knowledge between employees is to carry out joint projects between departments. Thus, it was satisfactory to measure only one factor. Similarly, the factors *Increasing professional know-how* and *Other skills* were joined as one factor, *Increasing other competencies*.

It is rational for an organization not to measure anything unnecessary because measurement always consumes resources. Thus, deleting overlapping issues from the measurement system was a natural step (see e.g. Hannula et al., 2002, p. 164; Toivanen, 2001, p. 129). In fact, in a small organization such as the case organizations, the scarcity of resources suggests that deleting overlapping issues is especially important (cf. Tenhunen et al., 2001).

Another type of change was made to the measurement systems because certain factors were considered too difficult to measure. At Alma Media, *Flow of information* was considered difficult to measure. No measure could be designed for measuring it. At Technology Industries of Finland, *Knowledge sharing* was considered too complicated to measure in relation to the perceived benefits. Similarly at the Work Efficiency Institute, *Effectiveness of organization's activities* was considered an important factor. However, it was deleted from the measurement system because no sound measure could be designed for measuring it. It is difficult to determine why just these issues were considered too difficult to measure. One reason is that each of the factors is somewhat vague. For example, the flow of information

should have been defined very carefully: what information should flow and between whom should the flows occur? For some reason, it was considered difficult to define the factors more precisely. In addition, there were not any realistic possibilities for collecting the data because of the vagueness of the intangible success factors. These experiences suggest that all intangible success factors may not be worth measuring as such. They may first have to be defined more narrowly as Brooking (1996) has suggested. However, it may not be easy in practice.

The third type of modification to the measurement systems was that some factors were deleted after reconsidering their importance. At the Work Efficiency Institute, these were *Utilizing networks* and *Improving career development possibilities*. Both of them were considered important factors. However, they were ultimately considered not critical enough to be measured. For example, improving career development possibilities is mainly a matter of management decision. It is not something that can be enhanced by just measuring if policies are not changed. Similarly at Technology Industries of Finland, *Fluency of decision-making processes* was considered not important enough to be measured. These decisions were basically about assessing the resources needed for measuring in relation to the possible benefits of measurement and what can be achieved using some means other than measuring.

The modifications described above can be interpreted in terms of assessing the soundness of the measurement. At the time of choosing the intangible success factors, the soundness of measurement was assessed already using three criteria: overlapping of the factors, the measurability of the factors (is a factor too immaterial to be measured) and the possible effects of measuring compared to some other activity. These issues are mainly related to the properties of the success factor (i.e. is it relevant to measure the factor and can the factor be measured?) and the measurement situation (i.e. resources needed and the other factors measured) (cf. Chapter 4.1.1.2; Figure 25).

One difference in choosing the success factors in the case organizations was the underlying measurement framework. The success factors were chosen using a balanced performance measurement approach at Technology Industries of Finland and the Work Efficiency Institute. At Alma Media, the factors were chosen using the Knowledge Audit Cycle. A key difference is that while the balanced performance measurement approach identifies the

success factors, the Knowledge Audit Cycle also identifies the existing knowledge management activities. Therefore, a question can be raised: did using the Knowledge Audit Cycle at Alma Media guide the process to choose factors that can be measured using the existing management systems? If this had occurred, it would have had two consequences. First, it might have caused the abandonment of some important success factors on the basis that they cannot be measured. Second, connecting the measures to an existing management system is likely to create practical performance measures. It seems that this has occurred to some extent. However, these issues are difficult to assess because there is no way of knowing the outcome if some other framework had been used in exactly the same situation.

8.2.1.3 What kinds of intangible success factors were measured?

The intangible success factors chosen by the case organizations are examined here by relating them to the different types of intangible assets and by discussing what kinds of factors are measured in each organization. Commonly, intangible assets are divided into three main types: human assets, relational assets and structural assets (Bukowitz et al., 2003, p. 4; Mettänen, 2002, p. 18; Sveiby, 1997, p. 12). On the other hand, intangible success factors consist of intangible assets and activities related to intangible assets (Danish Agency for Trade and Industry, 2000; Johanson et al., 2001; Meritum, 2001b).

Four intangible success factors are measured at Alma Media. *Employee competencies* and *Education* are related to the human assets of the organization. *Customer satisfaction* is related to relational assets and *Work atmosphere* to structural assets. *Education* is an activity-type factor; it is assumed that educating employees leads to increased competencies. The other three success factors refer to the amount of the assets. For example, what is the level of employee satisfaction?

At Technology Industries of Finland, seven intangible success factors are measured. *Increasing competencies* is related to human assets; *Quality of organization's services*, *Quality of consultant's work* and *Customer's learning during project* are related to relational assets; and *Efficient use of employees' time*, *Improving risk management* and *Work atmosphere* to structural assets. Two factors, *Increasing competencies* and *Improving risk management*, are activities. The other five are asset-type factors.

The measurement system of the Work Efficiency Institute consists of ten intangible success factors. Three of them, *Employee welfare*, *Increasing academic competency* and *Increasing competencies*, can be related to human assets. *Customer satisfaction of both users and financers*, *Internationalisation* and *Positive publicity* relate to relational assets. Factors related to structural assets include *Effective distribution of work*, *Effective project management* and *Sharing knowledge between departments*. Four factors are activity-type: *Increasing academic competency*, *Increasing competencies*, *Internationalisation* and *Sharing knowledge between departments*. The other six are asset-type factors.

Some of the success factors could have been associated with more than just one type of intangible asset. For example, *Internationalisation* refers to building international networks and personal contacts. On the one hand, this is about the relationships between the organization and its external partners (a relational asset). On the other hand, it is about developing employees' personal competencies (a human asset). Similarly, other success factors could be related to different types of assets. However, the point is not to provide some exact classification. Instead, it is to illustrate the different characteristics that the factors have.

Table 24 presents the intangible success factors of each case organization grouped according to the three types of intangible assets. All of the organizations have identified intangible success factors that can be related to each of the three types of intangible assets. This supports the rationality of the three-way-split of intangible assets which has been criticised in the literature by Mouritsen et al. (2001; see Chapter 3.4.2). It has been suggested that the three-way-split lacks certain properties, which limits its use as a managerial tool. However, it still seems useful at least as a tool for illustrating the different types of intangible assets in an organization.

Table 24. The intangible success factors of the case organizations and the three main types of intangible assets.

	Human assets	Relational assets	Structural assets
Alma Media	Employee competencies	Customer satisfaction	Work atmosphere
	Education		
Technology Industries of Finland	Increasing competencies	Quality of organization's services	Work atmosphere
		Quality of consultant's work	Efficient use of employees' time
		Customer's learning during project	Improving risk management
Work Efficiency Institute	Employee welfare	Positive publicity	Effective distribution of work
	Increasing academic competency	Customer satisfaction, financiers	Effective project management
	Increasing competencies	Customer satisfaction, users	Sharing knowledge between departments
		Internationalisation	

Most of the factors related to human assets focused on the competencies of employees. Similarly, issues related to customer satisfaction dominated regarding the factors related to relational assets. The factors related to structural assets were more diverse. They focused on issues such as work atmosphere, knowledge sharing and different ways of carrying out an organization's activities more efficiently.

The case organizations included both activity-type and asset-type factors in their measurement systems. These results suggest that both intangible assets and related activities are considered important, i.e. the results support the view presented in the literature (see e.g. Johanson et al., 2001). In addition, as suggested in Chapter 5.2.1.2 (especially Figure 35), the activity-type factors (e.g. education and improving risk management) are actions that are carried out in order to achieve business objectives regarding intangible assets (e.g. to achieve higher levels of employee competencies and customer satisfaction).

8.2.1.4 How were the measures defined for the intangible success factors?

At Alma Media, mostly existing measures were used, which made the definition of performance measures easier than in the two other organizations. However, the definition of the measures was basically similar in all cases. The list of success factors was examined factor-by-factor and possible ways of measuring each factor were discussed. A key determinant in ideating possible measures was to identify ways for obtaining information about the factor. As mentioned earlier, some iteration occurred in defining performance measures and redefining the success factors.

Two important criteria, validity and practicality, were used in all organizations while considering how a factor can be measured. The primary criterion in defining measures was validity, i.e. that the measure would represent the factor as fairly and accurately as possible. However, practicality was also an important criterion. On many occasions, the existing management structures and tools, e.g. the project evaluation tool at the Work Efficiency Institute, the employee-manager development discussions and the competency matrix at Alma Media, were used for collecting the data for measurement. Similarly at Technology Industries of Finland, the data for two measures were designed to be collected using a customer survey because it is carried out anyway. In these situations, there was no need to design new data collection methods. In addition, the existing management tools and the new performance measures could be connected together. This was considered positive because it would save resources, provide a connection for the otherwise separate management methods and not create any new redundant management systems.

Defining the measures of intangible success factors proceeded in quite the same way as expected on the basis of earlier literature (see Chapter 5.2.1). Because of the iteration between defining the intangible success factors and defining the measures, the two phases cannot easily be separated in practice. A noteworthy issue in defining the measures was that in many cases the measurement relies on existing management procedures, e.g. questionnaires that are carried out anyway. This way the measurement of intangible success factors can be carried out with reasonable resources.

8.2.1.5 What kinds of measures were used?

At Alma Media, one of the intangible success factors is measured using two measures and the other factors are measured using one measure for each factor. Four of the measures are subjective and only one is objective. The subjective measures include 'Customer relationships questionnaire', 'Assessment of relationships with most important customers', 'Employee questionnaire' and 'Guru ratio (percentage of key competencies possessed)'. The only objective measure is 'Workdays per month used for education'.

Each of the success factors is measured using one measure at Technology Industries of Finland. Five of the measures are subjective and two are objective. The subjective measures include 'Customer questionnaire', 'Assessment by project managers', 'Employee questionnaire', 'Customer questionnaire' and 'Percentage of employees who have reached personal development goals'. The objective measures are 'Time used on project ideas that are not realized' and 'Percentage of projects using the risk management tool'.

At the Work Efficiency Institute, one of the intangible success factors is measured using three (objective) measures, another factor using two measures (one objective and one subjective) and the other factors using one measure for each factor. Five of the measures are subjective and eight are objective. The subjective measures include 'Employee satisfaction index (questionnaire)', 'Percent of satisfied customers (questionnaire)', 'Percent of satisfied customers (questionnaire)', 'Mean ratio, calculated based on project evaluation form' and 'Percentage of employees who have reached personal development goals'. The objective measures include 'Organization's visibility in media (number of appearances)', 'Percentage of employees whose workload meets certain criterion', 'Number of joint projects between departments', 'Number of employees having attended an international occasion', 'Number of post-graduate credits', 'Number of post-graduate degrees', 'Number of other degrees' and 'Investments in education'.

The questionnaires were considered as performance measures as such at Alma Media. Usually, the information gathered using questionnaires is transformed into indicators using, e.g., mean ratio or median (see e.g. The Measures Catalogue, 2003). Compressing the questionnaires into single or a few indicators was not experienced as useful because it would have sacrificed a lot of information. In comparison to Alma Media, the questionnaire-

based performance measures are calculated as, e.g., means of responses at Technology Industries of Finland¹⁸ and Work Efficiency Institute.

A large share of the measures of intangible success factors in all organizations were subjective (see Figure 41). This was expected on the basis of the literature (Chapter 4.1.2; Rastas and Einola-Pekkinen, 2001, pp. 187 - 188). A typical subjective measure is a customer satisfaction or an employee questionnaire. A questionnaire can be used to measure many aspects of these intangible factors. For example, the issues related to the flow of information experienced as difficult at Alma Media were included in the employee questionnaire. Objective measures typically focus on more concrete issues than the subjective ones, such as the number of appearances in the media and the investments in education.

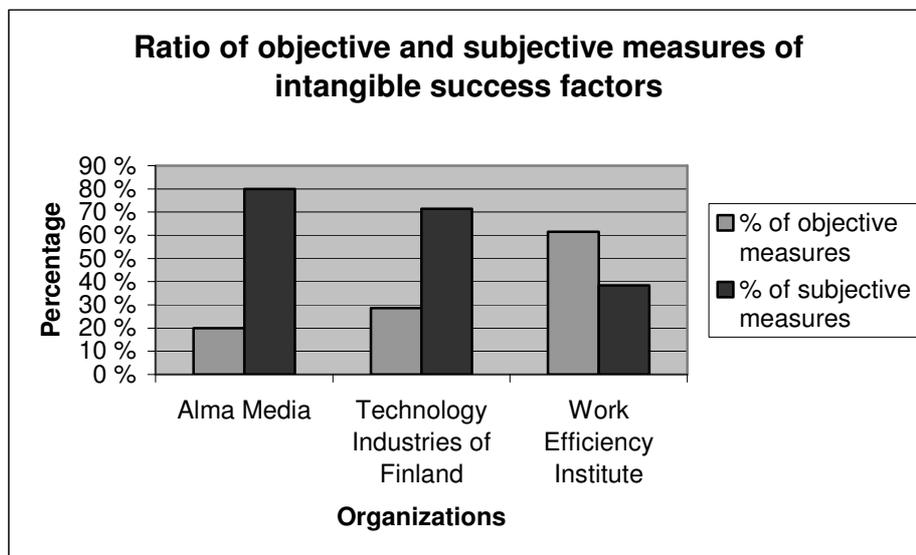


Figure 41. The ratio of objective and subjective measures of intangible success factors in the case organizations.

The way objective and subjective measures are used can be analysed even further. In Table 25, the numbers of objective and subjective measures used for both asset and activity-type factors are compared. This comparison shows that eighty percent of the measures used for measuring asset-type factors are subjective and only twenty percent are objective. The

¹⁸ Later during the implementation, the representatives of Technology Industries of Finland also considered that condensing the measurement results of a questionnaire into a single indicator was not necessary (see Chapter 7.2.2).

situation is completely the opposite in the case of the activity-type factors: eighty percent of the measures used for measuring activity-type factors are objective and only twenty percent are subjective. These figures describe the average situation in all three case organizations. There are, however, differences between companies. For example, Technology Industries of Finland has one objective and one subjective measure for measuring activity-type factors.

Table 25. Comparing the number of different types of measures used for measuring different intangible success factors.

	Alma Media	Technology Industries of Finland	Work Efficiency Institute
<i>N. of asset-type factors measured</i>	3	5	6
N. of objective measures used	0	1	2
N. of subjective measures used	4	4	4
<i>N. of activity-type factors</i>	1	2	4
N. of objective measures used	1	1	6
N. of subjective measures used	0	1	1

The comparison described in Table 25 has not been made in earlier research. However, the result appears reasonable. Activities are concrete, which makes them easy to describe in terms of objective numbers. One can ask questions regarding an activity, such as how many times is it carried out, who carries out the activities, how many persons are performing them, etc.? These questions can easily be turned into performance measures, e.g. the number of days in a month used for education per employee or the number of employees who have attended an international occasion. In comparison, the asset-type factors are more immaterial and multidimensional (i.e. an asset contains several aspects). Therefore, subjective measures are well suited for measuring them because they can be designed so that they cover the immaterial phenomena well. In addition, asset-type factors often include subjectivity because they concern, e.g., the satisfaction of customers and the welfare of employees. Thus, the stakeholders in question can describe these subjective issues themselves¹⁹.

¹⁹ It can be criticized that sometimes the respondents in the case of the subjective measurements may want to provide faulty information because it serves their interests. Nevertheless, a person experiencing a subjective incident is likely to describe it best.

8.2.1.6 How was the data obtained for the measures?

In all case organizations, choosing the data source was an integral part of defining the measures, i.e. choosing the data source cannot be treated as an individual phase of the measurement process. On many occasions, the existence of a certain managerial tool, e.g. customer questionnaire or work time report, guided the defining of a measure in such a way that the existing tool could be used. For example, an existing time management tool was used as the basis for performance measures at Technology Industries of Finland and the Work Efficiency Institute. However, there was no existing data source for some measures, e.g. the customer satisfaction measure at the Work Efficiency Institute, which had to be created.

The data sources for the measures at Alma Media include questionnaires, competency matrix, work time report and financial reports (for the measure 'Investments in education'). At Technology Industries of Finland, the data sources consist of questionnaires, an assessment form for consultants, work time report and employee-manager development discussions. The Work Efficiency Institute's measures are based on questionnaires, a project evaluation tool, work time report, employee-manager development discussions, employees' reporting their international activities themselves, financial and administrative documents and an external service provider (media survey). It seems that the data is collected for the measures in various sources just as expected (cf. Johanson et al., 2001; Meritum, 2001a, p. 29).

It has been previously suggested that one of the main problems in designing measures of intangible success factors is the lack of systems that provide the data for the measure (Lönnqvist and Mettänen, 2002, p. 152). However, many of the measures designed at the case organizations are based on some existing management tools. Despite this, some of the existing systems had to be modified in order to provide the data needed and some had to be designed from the start.

8.2.2 Challenges in the design phase

According to a survey by Leinonen (2001, p. 5), difficult phases in a measurement system design project are to develop and improve information systems and make the necessary

connections between measures and the information systems. Hacker and Brotherton (1998) have also presented similar results. Also in the organizations of this study, designing the new data collection methods, e.g. questionnaires, took a lot of time. However, the existing management structures and tools, e.g. the project evaluation tool at the Work Efficiency Institute and the competency matrix at Alma Media, offered practical means for collecting the data for measurement.

The lack of information systems that provide the data needed for some performance measures had two implications. First, the existing information systems did not usually guide the designing of these measures towards choosing the easy solution because they were not available. An easy solution refers here to choosing the data collection method that is the easiest to carry out regardless of the consequences for the validity and reliability of the measure (cf. Neely, 1998a, p. 41). However, as mentioned, there were also many measures for which data could be collected using the existing systems. Second, designing the new measures of intangible success factors required also designing new data collection methods. This requires a certain amount of skills and resources from the people carrying out the designing. For example, the designing of subjective measures requires skills regarding which type of questions to ask, how to collect data, how to analyse it etc.

In the case organizations, another significant problem experienced was that certain intangible success factors were considered as too difficult to measure. Certain issues were first considered as important factors, but they were later deleted from the measurement system because no sound measure could be designed for measuring them. Such issues included *Flow of information* at Alma Media, *Effectiveness of organization's activities* at the Work Efficiency Institute and *Knowledge sharing* at Technology Industries of Finland. These factors are quite immaterial and undefined, which may partly explain why they were considered hard to measure. Further definition of the aspects of the factors might have made them easier to measure (see Brooking, 1996, pp. 98 - 99). However, that might have led to creating managerially irrelevant measures by focusing on too narrow issues.

A certain type of problem was trying to measure factors for which measurement may not be a very applicable management practice. For example, *Utilizing networks* and *Improving career development possibilities* were considered important at the Work Efficiency Institute. However, it was considered that they could be better influenced by other means than

measuring them. Similarly at Technology Industries of Finland, *Fluency of decision-making processes* was considered not important enough to be measured. These experiences illustrate the fact that, although measurement is a versatile tool for management, it is not well suited for all situations. This seems to apply also to measures of intangible success factors.

Two basic options were commonly applied in defining the performance measures. One was to design a subjective measure that would capture the various aspects of a factor. The other way was to design an objective measure that would provide quantitative and reliable results. These two ways have both advantages and disadvantages (Lönnqvist and Mettänen, 2002; Rastas and Einola-Pekkinen, 2001, p. 187). Subjective measures are often valid; objective measures sometimes focus only on certain aspects of a factor which make them less valid. On the other hand, objective measures may be cheaper and easier to manage than subjective measures. Thus, choosing between these options regarding each success factor was a decision that would affect the later phases of measurement.

In conclusion, the specific problems in designing measures of intangible success factors identified by combining the findings of earlier research and the experience of the case organizations consist of the following issues. First, intangible success factors are by definition immaterial and vague, which makes them hard to operationalize, i.e. transform into measurable form. Second, it is possible to define a factor more narrowly in order to focus measurement on some specific aspect of the factor that can be more easily measured. However, focusing only on a narrow aspect of a factor may lead to invalid and managerially irrelevant measurement results. Third, subjective measures may capture the intangible factors better than (narrow) objective measures, but designing and operating them requires skills and resources. Fourth, measuring factors for which measurement may not be a very applicable management practice may cause problems. Fifth, there may not be any information systems readily available that provide the data needed or the existing systems must be updated. Designing data collection methods also requires skills and resources.

Those problems presented are mainly related to *defining* performance measures. Other issues identified in the earlier literature as problems, e.g. choosing what factors to measure and balancing the factors in the measurement system (Bourne et al., 2003, p. 19; Leinonen, 2001, p. 12), were not considered especially complicated in the case organizations. Some of the problems related to designing performance measures in general (not just to measures of

intangible success factors) include, e.g., the time and expense required and the need to quantify results that are more qualitative in nature (Bourne et al., 2003, p. 19). The time and expense required was evident especially in designing the subjective measures. The need to quantify results that are more qualitative in nature is actually the essential topic of this thesis: how to measure factors that are intangible, i.e. qualitative in nature and difficult to quantify.

8.3 Implementing performance measures of intangible success factors

8.3.1 How were the measures implemented?

At Alma Media, the implementation of the measures of intangible success factors was quite easy because most of the measures existed already. However, already during the design phase it was decided not to implement one measure: There was an existing employee questionnaire used throughout the organization that was partially overlapping with the smaller questionnaire that was designed. Thus, the implementation of the new measure was rejected. During the actual implementation phase, the personnel questionnaire was updated, the competencies of the competency matrix were updated and a new tool to monitor the internal mistakes was implemented. Actually, only one totally new measure, the ‘Guru ratio’, was implemented. The first results of that measure were calculated as part of implementing it.

The implementation at Technology Industries of Finland involved several issues. First, the questions of the customer questionnaire were modified. Second, one success factor was slightly modified: *Customer’s learning* was renamed *Change in customer’s operations*. Third, the time management tool was updated including planning how its results are reported. Fourth, the measure of *Risk management* was abandoned. It was decided to improve risk management using other means than measuring. Fifth, discussing the measurement of *Quality of consultant’s work* led to creating the criteria for a consultant’s work. In addition to these activities, some experience had been gained about the measures: open questions of the questionnaires are considered good and measurement results do not have to be collected on a scorecard. The personnel of Technology Industries of Finland considered that, from the point of view of a successful implementation of the measures, it

was necessary to create applicable data collection methods and tools (e.g. customer survey and time management tool). Also Bourne et al. (2000, p. 758) and Leinonen (in Hannula et al., 2002, p. 175) consider it an important phase in the implementation.

The specific activities in the implementation phase at the Work Efficiency Institute included the following. First, the first results of some measures were calculated. Second, there were discussions about the properties of the measures (especially problems related to measures of *Positive publicity* and *Competencies*). Third, measures were defined more accurately, including target setting. Fourth, it was decided not to measure *Employee welfare*. It was considered that although the factor is important, measuring it is not important enough. Finally, the measure 'Number of other degrees' was also deleted because of problems related to defining the factor and because the issue is also discussed in the employee-manager development discussions. Implementation proceeded faster in one department than in the other two. This was mainly due to an active manager at the department. This supports the notion that managerial support is important for successful implementation (cf. Bourne et al., 2002, p. 762; Hacker and Brotherton, 1998; Institute of Management Accountants, 1998, p. 49).

Many small changes were made to both subjective and objective measures during the implementation phase in all three case organizations. This suggests that the final design of the measures occurs only when the measures are put into practice – a view supported, e.g., by Kaydos (1999, p. 192). Further, the relevance and practicality of the measures can be more easily addressed when there is experience of implementing the measures: as remarked by the personnel at the Work Efficiency Institute, the usefulness of the measures is impossible to fully determine before gaining practical experience from using the measures. In addition, the changes carried out might suggest that the measures were first poorly defined. An inadequate definition of measures means that more work is required in the implementation phase. Bourne et al. (2003, p. 19) have identified that as a problem in the implementation phase. On the other hand, implementation made it necessary to consider thoroughly the measures designed, which helped to pinpoint some problems with them (see the next chapter).

The final form of many of the performance measures was not that of a typical managerial indicator, i.e. a single figure or ratio. Instead, the results of, e.g., questionnaires are

examined as a distribution of answers – not only as mean ratios. In addition, qualitative information was considered especially valuable. This may be related to the small size of the case organizations. The managers and employees of small organizational units are not likely to have the problem of information overload as it occurs, e.g., in the top management of large organizations. Thus, they have the time to examine single issues more thoroughly. Regardless of the reason, the result itself is in line with some of the recent writings of Andy Neely (2003). He states that performance measurement should focus on finding answers, not on producing a certain type of data for performance reviews. His example concerns larger organizations, but the same phenomenon can be identified also in these cases. Therefore, the form of a measure may be considered not as important as the fact that it produces useful insight for managers.

During implementation, also other kinds of development activities were carried out. For example, such activities included the implementation of a new tool to monitor the internal mistakes at Alma Media, developing a new risk assessment tool at Technology Industries of Finland and updating the existing management systems, such as customer surveys. This suggests that there may be other benefits in addition to receiving new performance measures when measures of intangible success factors are designed and implemented. This seems to be due to the fact that discussing issues related to intangible success factors points up problems related to them. When the problems have been pointed up, they can be dealt with.

Implementation proceeded more slowly than planned in all case organizations. Especially, implementation of the subjective measures was time-consuming. For example, according to Kaplan and Norton (1996, p. 309), the designing and implementing of a Balanced Scorecard should take 16 weeks. Although this cannot directly be compared to designing and implementing measures of intangible success factors in the case organizations, it gives some kind of reference for the duration of these phases. In the case organizations in this research, the designing and implementing of the performance measures took about one year, i.e. three times more than Kaplan and Norton suggest, and after that time all measures were still not implemented. This could mean that the projects were poorly managed. On the other hand, it might suggest that designing and implementing performance measures of intangible success factors is difficult and laborious in practice. It would seem likely that the long duration of the implementation of the measures of intangible success factors is related to the fact that

many of the measures were subjective and that data collection systems had to be created for many of them.

According to Bourne et al. (2002, p. 767), implementation of performance measures is a mechanistic task. Also the implementation of the measures of intangible success factors at the case organizations consisted mainly of tasks that can be considered mechanistic, e.g. updating existing data sources for measures and collecting first sets of measurement data. However, there were also other tasks that cannot be considered more mechanistic than the tasks during designing. This type of tasks included, e.g., further defining the measures and carrying out various development activities. This suggests that the implementation of measures of intangible success factors may include more non-mechanistic tasks than implementing more traditional-type measures.

8.3.2 Challenges in the implementation phase

Because of the general rush in everyday work at Alma Media, there was a lack of time to concentrate on development issues such as performance measurement. This led to the situation that some of the issues discussed during the measurement project were forgotten and not paid attention to in everyday work (between meetings related to measurement). The implementation phase took longer than planned because the personnel had many other responsibilities in addition to the implementation. In other words, the resources of the persons carrying out the implementation were limited. Lack of resources is a key challenge in implementing performance measures (Bourne et al., 2003, p. 19; Leinonen, 2001, p. 13). In this case, the small size of the organization is likely to be related to the lack of resources (cf. Tenhunen et al., 2001). Implementation of 'Guru ratio' was easy because the system providing the data, i.e. the competency matrix, was already in use. An employee questionnaire that had been designed was not implemented because it was partially overlapping with an existing survey of the whole business division. From the point of view of developing measures for the business unit, this can be seen as a problem caused by parent company actions – a problem identified by Leinonen (in Hannula et al., 2002, p. 175).

The implementation of performance measures failed at one of two departments of Technology Industries of Finland. This was mainly due to the leaving of a key employee.

Also, it was decided not to implement one designed measure. An issue affecting the decision was the parent organization's initiative to do a competency survey which was considered overlapping with the measure of *Increasing competencies*. This situation is similar to that described above regarding the employee questionnaire at Alma Media. Also the busyness of the employees seems to have affected implementation; it proceeded a lot more slowly than anticipated (cf. Bourne et al., 2003, p. 19; Leinonen, 2001, p. 13).

The implementation at Technology Industries of Finland was considered difficult regarding two measures. First, designing the assessment form for the measure of *Quality of consultant's work* took a lot of time because the criteria for a consultant's work had to be created first. The problem was caused by insufficient definition of the measures in the design phase. Poor definition of the measures is another key challenge in implementation identified by Bourne et al. (2003, p. 19). Second, the measure of *Increasing competencies* was considered problematic. The issues related to developing personal competencies were considered too qualitative to be measured. It seems that also this problem might have been avoided by more careful defining of the measure. In comparison, the measures based on a customer questionnaire and the time management tool were considered easy to implement because only small changes had to be made to these existing tools.

At the Work Efficiency Institute, the practical handling of the data needed for the measures was experienced as somewhat laborious and complicated. The measures for which the data collection methods did not previously exist were especially troublesome. The implementation of the measures of *Effective distribution of work*, *Effective project management*, *Sharing knowledge between departments* and *Internationalisation* had succeeded as planned. All of the factors, except project management, are measured using objective measures which have been considered easier to use than subjective measures (see Chapter 4.1.2). A system already existed for measuring *Effective project management* (the project evaluation tool) which made the implementation of the measure easy.

There were problems of target setting with the 'Number of post-graduate credits'. It was considered difficult to set a target that would be in balance between working fulltime and studying to improve one's competencies. This problem appears to be caused by poor designing of the measure; it seems that the problem could have been identified earlier. There were also problems with the measure based on employee-manager development discussion;

it was questioned whether it would be possible to set targets that are explicit enough to make the comparisons required. It was considered that the individual development targets are usually so inexact that comparison might be difficult. Similar problems were experienced at Technology Industries of Finland. In addition, there were problems with the customer satisfaction questionnaire for the users of the research; there had been only few answers to the questionnaire, i.e. the data collection method was functioning poorly. Therefore, it was decided to change the method for targeting the customers. This also supports the view that the soundness of a measure is difficult to assess before having practical experience of applying the measure (Kaydos, 1999, p. 192).

Measurement of competencies using employee-manager development discussions was considered problematic both at Technology Industries of Finland and the Work Efficiency Institute. Although the same measure was not used at Alma Media, their experience with employee-manager development discussions emphasizes the problems related to the measure: At the time when the previous employee-manager development discussions were carried out, a certain new education course was not yet available. This might have affected the realization of the decisions and objectives made in the development discussions. It seems that the design of the measure is not good. The problem seems to be caused by trying to quantify a phenomenon that is qualitative in nature (cf. Bourne et al., 2003, p. 19). It can be assumed that it would be sensible to use the discussion as such as a tool for managing competencies and not try to force it into a quantitative measurement result.

The data collection methods had to be created for many of the measures. This took a lot of time and effort. In fact, two of the case organizations had still not implemented all of the measures one and a half years after the start of the measurement system design projects. This was mainly due to the everyday rush in the organizations (making other things more important) and the time spent on the final designing of the measures and in developing the data collection methods. All of these issues have been identified earlier as causing problems by Bourne et al. (2003, p. 19).

The biggest challenges in implementing the measures of intangible success factors in the case organizations related to the subjective and the questionnaire and evaluation-based measures, e.g. customer surveys at the Work Efficiency Institute and the assessment of the quality of consultants' work at Technology Industries of Finland. It took a lot of time to

implement these measures. A certain amount of final designing of the measure was also carried out during implementing. In addition to the measure itself, the data collection method, e.g. a telephone interview or a postal questionnaire, had to be designed and implemented also. This was experienced as laborious.

While there were problems in implementing the subjective measures, the measures based on objective facts seemed to be easy to implement. Such measures include 'Number of post-graduate credits', 'Time used on project ideas that are not realized' and 'Number of joint projects between departments'. These easy-to-implement measures all focus on specific and clearly defined issues, which makes them straightforward to measure. On the other hand, they may not be considered to be as relevant as the more comprehensive measures because they provide information regarding so narrow a phenomenon (see e.g. Rastas and Einola-Pekkinen, 2001, p. 187).

In summary, the following specific challenges were identified in implementing the measures of intangible success factors. First, the subjective measures are difficult and laborious to implement. Second, related to the previous point, the development of the data collection methods also consumes a lot of resources. Third, it seems that the measures of intangible success factors are difficult to define with adequate precision during the design phase. Thus, the further defining of the measures in the implementation phase also consumes a lot of resources. In addition to these specific problems, many of the issues identified in previous research caused a certain amount of problems. For example, because the personnel's resources are limited and they have many other responsibilities, there was not always enough time for the measurement system project (cf. Bourne et al., 2003, p. 19). In another case it was decided that certain measures designed for an organizational unit were not implemented because the parent organization had partially overlapping activities under way (cf. Hannula et al., 2002, p. 175). The easiest measures to implement are objective measures and those subjective measures that are based on existing management tools which provide the necessary data.

8.4 Using performance measures of intangible success factors

8.4.1 How were the measures used?

At the time of examining the use of the measures of intangible success factors, all case organizations had used the newly designed measures of intangible success factors for only a short period of time. This has to be taken into account when assessing how they are used. In practice, it means that the results regarding the use of the measures are likely to have been different if the examination had been made, e.g., one year later. This is due to the fact that some measures have actually not even been used yet.

All measures of intangible success factors at Alma Media, with the exception of 'Guru ratio', have been used before this measurement project. Thus, the organization has experience with the use of measures of intangible success factors. Therefore, it was a good case for examining the use of the measures. At Alma Media, the measures are used in various situations and they have led to many activities. The results of the measures are mainly reported to all personnel.

At Technology Industries of Finland and the Work Efficiency Institute, the implementation of some measures was unfinished, which makes it difficult to assess the use of the measures. The measurement results have been reviewed at Technology Industries of Finland in the discussions between the group manager and project managers and they have, e.g., been taken into account in following projects and in designing guidelines. At the Work Efficiency Institute, the measurement results are reviewed at the organizational level and at the level of departments and projects. Many of the measures have led to some activities. For example, the measure 'Number of joint projects between departments' has guided management's activities towards designing actions for improving the underlying factor.

Some of the measures had generated actions although the measurement results had not even been calculated yet. For example, at the time the two measures of *Increasing competencies* at the Work Efficiency Institute had not yet been completely implemented, they had already led to assessing the educational needs and setting objectives regarding annual investments in education. This underlines the fact that measurement highlights the importance of the factor being measured (see e.g. Neely, 1998b, p. 56; Uusi-Rauva, 1996a). Focusing attention on a

factor may be enough to cause actions related to it. Therefore, an important success factor may be worth measuring even using a deficient measure if better possibilities are not available (Hannula et al., 2002, p. 164; Stivers et al., 1998, p. 48).

According to Simons (2000, p. 67), performance measurement can be used for the following purposes: decision-making, control, guidance, education and learning and external communication. The case organizations used performance measurement for all of those purposes. Here are examples of the different ways of using performance measures:

- *Decision-making:*
 - The measure 'Time used on project ideas that are not realized' has led to abandoning one project idea at Technology Industries of Finland.
 - The measure of *Effective distribution of work* has been used at the Work Efficiency Institute to allocate work more evenly.
- *Control:*
 - The measure of *Effective distribution of work* indicates possible problems and leads on to more specific examination of the issue.
 - The purpose of the measure of *Internationalisation* is to ensure (i.e. check) that all employees at Work Efficiency Institute gain international experience.
- *Guidance:*
 - The results of the measure of *Quality of organization's services* have been taken into account in following projects at Technology Industries of Finland.
 - The measure of *Internationalisation* guides employees at the Work Efficiency Institute to gain international experience.
- *Education and learning:*
 - The 'Guru ratio' has been used at Alma Media for designing education, recruiting and supporting self-studying.
 - The results of the measure of *Effective project management* have been used at Work Efficiency Institute as a basis in trying to develop more effective practices.
- *External communication:*
 - Results of 'Customer relationship questionnaire' at Alma Media are used in communication on the extranet.
 - One of the main reasons for measuring at Technology Industries of Finland in the first place was to be able to show its stakeholders the effects of the organization's work in the projects it carries out.

Many of the measures of intangible success factors are used for multiple purposes. It seems that the measures of intangible success factors were reviewed and used in the case organizations in a similar way as any other performance measure; measures can be used in

many ways depending on the situation (cf. Lönnqvist, 2002, p. 36). The difference between using measures of intangible success factors and other measures seems to be not how they are used but what issues are managed using them. For example, competencies or international relationships of employees cannot be managed using productivity or profitability measures. Thus, the almost self-evident conclusion is that the measures of intangible success factors make it possible to use measurement information (and the measures themselves) as a tool in managing intangible success factors.

There were differences between the organizations as regards the variety of ways for using the measures. These differences are mainly due to two reasons. First, Alma Media had more such measures that were already in use. Therefore, they had had the time to use the measures in a variety of ways. Second, the commenting by the representatives of different organizations varied. Alma Media's comments were very ample, while Technology Industries of Finland's were scantier (and the Work Efficiency Institute's somewhere in the middle). These interrelated issues explain partly why it seemed that measures are used more actively at Alma Media than at the other two organizations. On the other hand, it is also natural that performance measurement should have different roles in different organizations (cf. Lönnqvist, 2002; Neely, 1998a; Simons, 2000).

8.4.2 Usefulness of the measures and the problems of using measures

In presenting the results, first the results of the interviews are discussed and then those of the focus group. Finally, the results gained using both methods are compared and discussed jointly. In this chapter, the point of view is that of the users of the measures. The issues examined are which measures are considered useful, which are not and what are the reasons. The problems experienced in using the measures are also examined.

8.4.2.1 Analyzing the interviews

At Alma Media, all measures except 'Workdays per month used for education' are experienced as useful and effective. That measure is the only objective measure of intangible success factors; the others are subjective. It is hard to determine whether this is a coincidence. The open questions are experienced as especially useful in 'Customer relationship questionnaire'. Some problems have been experienced with 'Employee

questionnaire'. It does not leave room for improvement, i.e. it is not sensitive enough to identify areas for development. Earlier in the project another (shorter) employee questionnaire was designed especially for the business unit. It was not implemented because it was considered impractical to have two partially overlapping questionnaires. It seems justified to question this decision because the currently used questionnaire is not working well.

At Technology Industries of Finland, 'Customer questionnaire' is considered to be working fine. Also in this case, the open questions are experienced as especially useful. The measure 'Time used on project ideas that are not realized' is problematic because there are a lot of ideas and there is uncertainty regarding which project ideas should be accounted for. This seems to be an example of *the problem of scope* regarding which project ideas should be taken into account (cf. Neilimo and Uusi-Rauva, 1997, p. 39).

At the Work Efficiency Institute, many of the measures are considered "good at this stage", which means that they are satisfactory but not excellent and that they are likely to be developed in the future. The measure of *Positive publicity* is not experienced as very practical or useful because it is considered too expensive in relation to the perceived benefits. 'Number of post-graduate degrees' has been considered problematic because a post-graduate degree is such a big measurement unit, i.e., measurement results vary randomly because new post-graduate degrees are quite rare. Therefore, the results are considered managerially irrelevant. The measure 'Investments in education' misses part of the education carried out. Thus, the measurement result is not considered to represent the issue correctly, i.e. the validity of the measure is not very good (cf. Emory, 1985, p. 94).

As mentioned in the previous chapter, some of the measures of intangible success factors had generated actions although the measurement results had not even been calculated yet. This suggests that these measures have been useful as a tool for guiding activities. However, this is likely to be related to the phase of using a measure: It may be sufficient to have deficient measures in the early stages when the goal is to focus attention on some issue in order to create actions. However, more accurate information will probably be needed after the initial stage of using measures. It is likely that measures are used later, e.g., to examine improvement of measurement results. At this stage, the measurement information needs to be of good quality. The comments by the representative of the Work Efficiency Institute

support this conclusion. Many of the measures at the Work Efficiency Institute were considered good at this stage, but they were possibly going to be improved in the future.

In conclusion, there were measures in all case organizations that were experienced as effective and useful, as well as measures that were considered to be functioning poorly. It seems that the usefulness of subjective measures is often experienced as good. On the other hand, the objective measures, which often describe the success factors more narrowly than subjective measures, are more likely to be experienced as problematic. These results are in line with views presented by Rastas and Einola-Pekkinen (2001, p. 187) and Lönnqvist and Mettänen (2002). It was also suggested that those measures of intangible success factors that were considered somewhat problematic would still be valuable from the point of view of guiding activities. However, those measures must quite likely be developed further so that they can be useful also in the future.

8.4.2.2 Analysing the focus group

Franco and Bourne (2003a, pp. 317 - 323) suggest that the usefulness of performance measures is determined by the success of the design and implementation phases. Based on the focus group, all case organizations considered that the process of designing and implementing the measures was carried out without any major mistakes. At Alma Media, a poorly working reporting tool had caused the biggest problems during implementation. Although no major mistakes were identified at Technology Industries of Finland and the Work Efficiency Institute, the end results of the processes, i.e. the measures, were not fully satisfactory.

There were no big problems in using performance measures at Alma Media. However, the fact that the measures should lead to action had caused discussion. At Technology Industries of Finland, one measure caused frustration instead of motivating: a certain group of employees who work hard and receive good but not excellent results feel that it is impossible for them to improve their work. They also considered that interpreting measurement results of a questionnaire on a one-to-five scale is difficult and that qualitative information gives valuable additional information. Difficulties have been experienced at the Work Efficiency Institute with some subjective measures: subjectivity is considered an

important issue as such, but subjective results may not always correspond to the actual objective situation.

Representatives of Technology Industries of Finland were not satisfied with the measures used to describe the effectiveness of the organizations actions. At the Work Efficiency Institute, the measure of *Positive publicity* was considered quite poor because it is too expensive in relation to the perceived benefits (a problem that has been mentioned in earlier chapters). At the Work Efficiency Institute, one problem, not related to the functioning of the measures as such, is how to set reasonable objectives. Alma Media are considering improving the reliability of one measure, 'Assessment of relationships with most important customers', by designing the data collection method in another way.

Despite the problems mentioned above, the measurement systems as a whole were considered to correspond well to the needs of the case organizations. The measures that were experienced as most useful at all case organizations were the measures that describe the present situation of the organization's activities, i.e. operative measures. These include measures related to, e.g., customer satisfaction and quality of operations. It is easy to discuss these practical issues with other employees and it is easy to relate them to what each employee is doing. This experience is similar to what has been written regarding the properties of non-financial measures in general (see e.g. Lönnqvist, 2002, p. 20). Both qualitative and quantitative measurement information was experienced as useful. This is in accordance with the experience from the implementation phase: the form of the information is not as important as the fact that it produces useful insight for managers.

According to the interviewees at Alma Media and the Work Efficiency Institute, the soundness of the measures is difficult to assess because different users of the measures consider different issues important. In addition, the assessment of the usefulness of the measures was difficult because there was not enough experience of using the measures. The effectiveness of the measures is expected to be determined later based on experience regarding the use of the measures (cf. Kaydos, 1999, p. 192). All case organizations considered that the relationship between the benefits and costs of the measures is an important question to be answered in the future.

Representatives at Alma Media mentioned that the person responsible for a measure should also analyse the measurement information, i.e. the results should be presented with analyses and conclusions. This contradicts somewhat comments by Technology Industries of Finland and the Work Efficiency Institute at the implementation phase. In both organizations, it was considered that it is not necessary to condense measurement information. Rather, employees themselves can examine the measurement data and form conclusions. It is difficult to determine why the views were different. As mentioned before, different organizations may use measurement in different ways.

There have been discussions about whether to extend measurement to other parts of the organizations. This will be done in the near future at Alma Media. At Technology Industries of Finland, the same measures cannot be used in other parts of the organization where no projects are carried out. However, the goal was not to design universal measures that could be used anywhere other than in those specific organizations. Thus, this issue is not discussed here any further.

In conclusion, the following statements regarding the experienced usefulness of the measures are suggested on the basis of the focus group. First, the usefulness of many of the measures of intangible success factors is considered somewhat problematic. Second, the operative measures of intangible success factors are considered useful. Third, the usefulness of the measures in relation to resources used is important. However, it seems difficult to ascertain the usefulness in practice. Fourth, more important than the format of the measure (subjective or objective; qualitative or quantitative) is that it should provide valuable information for managers. Fifth, there may be problems in interpreting the measurement results of subjective measures.

8.4.2.3 Cross-method analysis

The interviews and the focus group provided supplementing information about the use of the measures. Interviews provided information that focused on assessing the properties of individual measures one by one. The focus group provided information about different types of measures and about other factors that were affecting the use of the measures of intangible success factors.

Both research methods showed that some measures were experienced as useful and some as problematic. On the basis of the interviews it seemed that subjective measures were often considered useful and that objective measures were often considered problematic. However, the focus group showed that also the subjective measures involved some problems, e.g. regarding the interpretation of the measurement results.

Results of both methods suggest that, from the point of view of the experienced usefulness of a measure, more important than the format of the measure is that it should provide valuable information for managers. For example, qualitative information, e.g. the open questions in questionnaires, was considered especially useful. On the other hand, the results of the interviews suggest that even deficient measures may be useful in guiding activities. Thus, the quality of the information that the measures provide may not always be the main criteria for the usefulness of the measures. In the early phases of using a measure, it may be sufficient to have deficient measures that can later be improved.

In the focus group, the operative measures of intangible success factors were considered especially useful. The same measures, e.g. the customer questionnaires at Alma Media and Technology Industries of Finland, were identified as most useful also in the interviews. While the operative measures were the most useful, it seems that measures describing the effects of activities and the competencies of employees were often more problematic and thus considered not useful.

At the time of applying both research methods, there was only a limited amount of experience from using the measures. Thus, it was difficult to make an assessment of their usefulness and the problems involved. However, all organizations considered the usefulness of the measures in relation to resources used as important. The usefulness of the measures in relation to resources seems difficult to ascertain in practice but it is likely to become easier in the future when more experience from using the measures has been gained.

In summary, subjective measures seem to capture well the intangible success factors. However, subjective measures may not always reflect the objective reality and they may lack the sophistication that would allow focusing on improvement. On the other hand, objective measures of intangible success factors may be problematic as regards validity and relevance. Therefore, they may not be considered managerially relevant. Despite these

generalisations, certain individual measures of both types were considered useful, while others were problematic in practice. It seems that the key factors in determining the usefulness of a measure are whether it provides managerially valuable information or guides activities. These benefits of measuring are assessed against the burdens of measurement, e.g. the cost of measuring and interpretation problems (cf. Lönnqvist and Mettänen, 2002).

8.5 Examining the three phases of measurement

The results and their analysis have been presented separately according to the phases of measurement, i.e. design, implementation and use. It was relatively easy to divide the whole process into these different phases for the purposes of studying them. Design meetings, implementation meetings and the focus group concerning using the measures provided natural settings for examining the different phases. However, as mentioned before, the process was iterative. Many implementation-related decisions were made during the early design phases. For example, how accurately and narrowly a success factor is defined affects the choice of what kind of measures can be used. Further, the choice of different measures directly affects how they can be implemented and used. On the other hand, it seems that the final designing of the measures occurs only during their implementation. Thus, in practice, the different phases of measuring intangible success factors are overlapping (cf. Bourne et al., 2000, p. 758; Kaydos, 1999, p. 192).

The soundness of the measures of intangible success factors was assessed in various phases. When choosing the factors to be measured, the soundness of measurement was assessed on overlapping of the factors, the measurability of the factors and the possible effects of measuring compared to some other activity. During defining, the soundness of measures was assessed mainly regarding validity and practicality. An important determinant of practicality was the availability of information systems that provide the data for the measures. Although some measures were considered sound in the design phase, the implementation phase revealed problems in them. Thus, practical experience of applying the measures was needed in many cases in order to be able to assess the soundness of the measures. In addition, it was considered that it would require more experience from actually using the measures before their soundness could be fully determined. On the other hand, it is possible to redesign improved measures based on assessing the soundness of measures in

any phase. The assessment of the soundness of the measures seems similar to that what was expected on the basis of earlier literature (e.g. Hannula, 1999, p. 78; Kaydos, 1999, p. 192) and the model presented in Chapter 5.3.1 (Figure 38).

In Chapter 5.3.1, it was suggested that the validity and relevance of a measurement system, i.e. the “coverage of intangible success factors”, would decrease during the phases of measurement. Next the case material is examined in light of that proposition. In the model presented in Figure 38 (Chapter 5.3.1), designing measures starts with identifying the intangible success factors. In the second phase, the success factors to be measured are chosen. These two phases are examined using the case material by comparing the number of intangible success factors initially identified in each organization with the number of factors chosen to be measured. Table 26 presents the situation in each organization.

Table 26. The intangible success factors identified and decided to be measured in the case organizations.

	Alma Media	Technology Industries of Finland	Work Efficiency Institute	Total
Number of factors initially identified	6	10	16	32
Number of factors measured	4	7	10	21
Percentage covered	67 %	70 %	63 %	66 %

The number of intangible success factors initially identified was greater in each organization than the number of factors chosen to be measured. This is due to deleting factors because of overlapping, because some factors were considered too difficult to measure and because of the importance of some factors was reconsidered. Comparing the numbers of factors is not a completely valid measure of the “coverage of intangible success factors” because the substance of many of the factors had also been changed between the phases. Thus, the percentage in the bottom line of Table 26 is not to be interpreted as an exact estimate of the coverage of the factors. Instead, it illustrates the magnitude of the difference between the two phases.

In the next phase of the model presented in Chapter 5.3.1, the measures are defined for the factors. It is clear that the measures do not represent the factors perfectly because of problems with validity (see Chapter 4.1.1). However, it is difficult to estimate the degree of

invalidity. Nevertheless, as a result of defining the measures, the measures were more or less ready to be implemented. Table 27 presents the number of measures defined and the number and percentage of them that were also implemented.

Table 27. Number of measures defined and the number and percentage of them that were also implemented in the case organizations.

	Alma Media	Technology Industries of Finland	Work Efficiency Institute	Total
Number of measures designed	5	7	13	25
Number of measures implemented	5	4	7	16
Percentage implemented	100 %	57 %	54 %	64 %

The implementation seems more successful at Alma Media than in the two other organizations. However, many of the measures at Alma Media existed already before the implementation phase. Thus, the situations are comparable. The percentage of measures implemented was low at Technology Industries of Finland and the Work Efficiency Institute because of, e.g., difficulties with subjective measures, the time spent on defining and implementing the data sources of the measures and lack of resources. If it is considered, for the sake of argument, that the measures represent the success factors perfectly, it is possible to assess how much the coverage has decreased during implementation. This can be accomplished by calculating the percentages of Table 27 from the corresponding figures of Table 26. In this way the percentages covered are as follows: Alma Media 67 percent, Technology Industries of Finland 40 percent and the Work Efficiency Institute 34 percent²⁰.

After implementation, the next phase is to use the measures. It is here considered that the same number of measures are *in use* as had been successfully implemented at the time of examining the use of the measures in the case organizations. Table 28 presents the number of measures in use as well as the number of measures that have been used for initiating some kind of actions. This comparison has been made because the model presented in Chapter 5.3.1 questions whether some of the measures are actively used.

²⁰ A summarizing table will be later presented which describes these percentages (see Table 29).

Table 28. Number of measures in use and the number and percentage of measures that have been used for initiating actions.

	Alma Media	Technology Industries of Finland	Work Efficiency Institute	Total
Number of measures in use	5	4	7	16
Number of measures that have led to actions	5	3	5	13
Percentage leading to actions	100 %	75 %	71 %	81 %

As the table above suggests, not all measures have been actively used. This may be due to the fact that there has not yet been an opportunity to use the measures because the examination was done so soon after implementing the measures. That seems to be the situation in the case of the measure of *Internationalization* at the Work Efficiency Institute. In some cases, the lack of active use seems to be also caused by problems with the measure. This is clearly the case with the measure of *Positive* publicity at the Work Efficiency Institute and possibly with the measure of *Work atmosphere* at Technology Industries of Finland. On the other hand, some measures had led to actions even before they were fully implemented, e.g. the measures of *Increasing competencies* at the Work Efficiency Institute. When the percentages of Table 28 are calculated from the ‘coverage percentages after implementation phase’, the percentages covered after using the measures are as follows: Alma Media 67 percent, Technology Industries of Finland 30 percent and the Work Efficiency Institute 24 percent.

Table 29 presents a summary of the coverage percentages that were calculated earlier regarding the different phases of measurement. The percentages presented are visualised in Figure 42.

Table 29. Coverage percentages after different phases of measurement.

	Alma Media	Technology Industries of Finland	Work Efficiency Institute	Average
After design phase (factors to be measured)	67 %	70 %	63 %	67 %
After implementation (measures implemented)	67 %	40 %	34 %	47 %
Experience after preliminary use (measures actively used)	67 %	30 %	24 %	40 %

The whole process from identifying the intangible success factors to using the measures in practice is illustrated in Figure 42. The practice seems to correspond quite well with what was expected (cf. Chapter 5.3.1; Figure 38). In the case of Alma Media, the model does not seem to fit well. However, the process at Alma Media is atypical since most of the measures already existed. Thus, many of the problems experienced by the two other organizations did not occur at Alma Media.

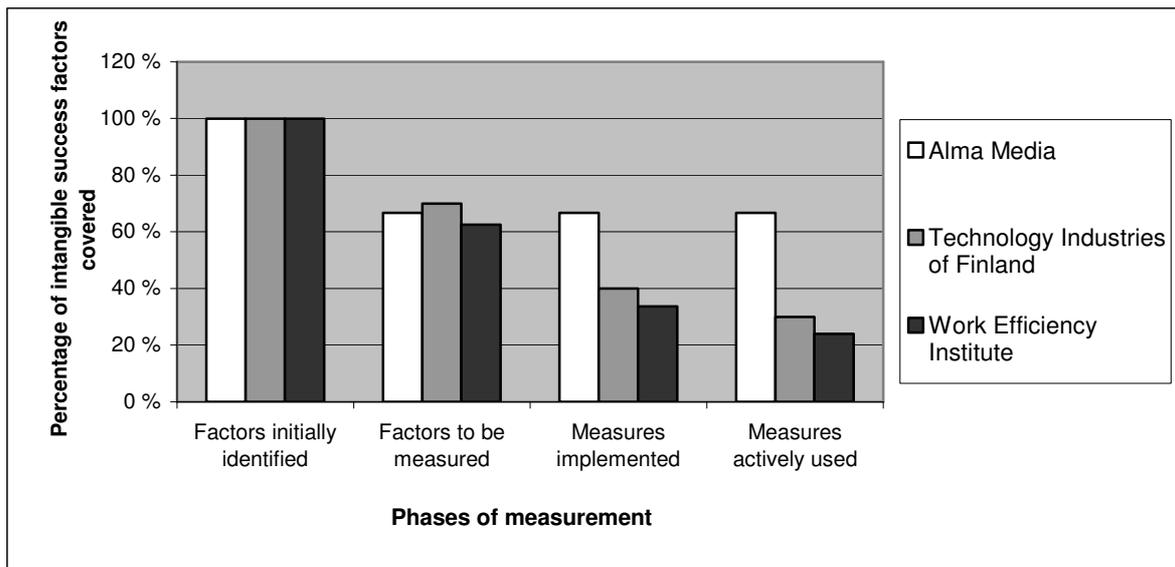


Figure 42. The percentage of intangible success factors covered in different phases of measurement.

Stivers et al. (1998) have identified two gaps between different phases of measurement. The first is the importance-measurement gap. It can also be observed in the case organizations. First, not all intangible success factors that were first identified as important are actually chosen to be measured (Table 26). Second, not all factors chosen to be measured can be measured because of problems in designing and implementing the measures (Table 27). The second gap identified by Stivers et al. is the measurement-use gap. It too can be identified in the case organizations because some measures used had not led to any actions (Table 28). In addition to providing support for the results of Stivers et al. (1998), this study has also provided some explanations for the gaps.

8.6 Summary

The analysis presented in the previous chapters created a lot of results and answers to the research questions. They are not repeated in this summary. Instead, only a few general remarks are made here. The key findings of the study are presented and assessed in the following chapter.

The three case organizations were all small and knowledge-intensive organizations. However, there were many differences in the measurement systems. This supports the view that an organization's critical intangible success factors and their measures are organization-specific (see e.g. Mouritsen et al., 2003a). There were also many similarities between the case organizations. The iterative process of redefining the success factors and measures was similar in all cases. In addition, each organization's intangible success factors consisted of similar issues: *Customer satisfaction* and *Increasing competencies* were measured in all organizations. Also *Work atmosphere* as well as issues related to the efficiency of operations were measured in two organizations. Further, the performance measures in all cases consisted of both subjective and objective measures.

9 CONCLUSIONS AND DISCUSSION

This chapter starts with providing answers to the research questions and presenting the contribution to prior research. Then, the research is assessed regarding various criteria. Finally, areas for further research are suggested.

9.1 Key findings of the study

9.1.1 Secondary research questions

9.1.1.1 Q1: How are the measures of intangible success factors designed?

The case organizations chose the intangible success factors to be measured by identifying important factors based on managerial needs and then deciding which are important enough to be measured. The process included a lot of iteration because some changes were carried out in order to reduce overlapping or redundancy in measures, certain factors were considered too difficult to measure and some factors were deleted after reconsidering their importance. Factors that can be related to all three main types of intangible assets – human assets, relational assets and structural assets – were chosen to be measured. Also both activity-type and asset-type factors were measured.

Two important criteria, validity and practicality, were used in all organizations while considering how a factor can be measured. A large share of the measures of intangible success factors in all organizations were subjective, as was expected on the basis of the literature (Chapter 4.1.2; Rastas and Einola-Pekkinen, 2001, pp. 187 - 188). A typical subjective measure is customer satisfaction or an employee welfare questionnaire. A questionnaire can be used to measure many aspects of these intangible factors. Objective measures typically focus on more concrete issues than the subjective ones, such as the number of appearances in the media and the investments in education. Asset-type factors are usually measured using subjective measures and activity-type factors using objective measures.

Choosing the data source is an integral part of defining measures. Many of the measures of intangible success factors designed in the case organizations were based on some existing

management tools. It has been previously suggested that one of the main problems in designing measures of intangible success factors is the lack of systems that would provide the data for the measures (Lönqvist and Mettänen, 2002, p. 152). When existing management tools are used, there is no need to design new data collection methods. Therefore, measurement can be carried out with reasonable resources. In addition, the existing management tools and the new performance measures can be connected together.

9.1.1.2 Q2: What are the main challenges in the design phase?

The specific problems in designing measures of intangible success factors were mainly related to defining performance measures. First, intangible success factors are by definition immaterial and vague, which makes them hard to operationalize, i.e. transform into measurable form. Second, it is possible to define a factor more narrowly in order to focus measurement on some specific aspect of the factor that can be more easily measured. However, focusing only on a narrow aspect of a factor may cause invalid and managerially irrelevant measurement results. Third, subjective measures may capture the intangible factors better than (narrow) objective measures, but designing and operating them requires skills and resources. Fourth, a certain type of problem was trying to measure factors for which measurement may not be a very applicable management practice. Fifth, there may not be any information systems readily available that would provide the data needed or the existing systems must be updated. Designing data collection methods also requires skills and resources.

9.1.1.3 Q3: How are the measures of intangible success factors implemented?

Implementation of the measures of intangible success factors at the case organizations consisted mainly of tasks that can be considered mechanistic, e.g. updating existing data sources for measures and collecting first sets of measurement data (as suggested by Bourne et al., 2002, p. 767). However, there were also more non-mechanistic tasks, e.g. further defining the measures and carrying out various development activities. The implementation of the measures of intangible success factors took longer than expected in the case organizations. This would seem to be due to the fact that many of the measures were subjective and that data collection systems had to be created for many of them.

The final design of the measures of intangible success factors seems to occur only when they are put to practice – a view supported, e.g., by Kaydos (1999, p. 192). Also the relevance and practicality of the measures can be more easily addressed when there is experience of implementing the measures. It seems that the final form of many of the performance measures implemented may not be that of a typical managerial indicator, i.e. a single figure or ratio. Instead, the results of, e.g., questionnaires can be examined as a distribution of answers – not only as mean ratios. Therefore, the form of a measure may be considered not as important as the fact that it produces useful insight for managers. Finally, there may be benefits additional to receiving new performance measures when measures of intangible success factors are designed and implemented. These include making development activities for issues that have been identified as problems as a result of designing and implementing the measures.

9.1.1.4 Q4: What are the main challenges in the implementation phase?

The following specific challenges were identified in implementing the measures of intangible success factors. First, the subjective measures are difficult and laborious to implement. Second, related to the previous point, the development of the data collection methods also consumes a lot of resources. Third, it seems that the measures of intangible success factors are difficult to define with adequate precision during the design phase. Thus, the further defining of the measures in the implementation phase consumes a lot of resources as well.

9.1.1.5 Q5: How are the measures of intangible success factors used?

The case organizations used the measures of intangible success factors for all typical purposes mentioned by Simons (2000, p. 67): decision-making, control, guidance, education and learning and external communication. Many of the individual measures of intangible success factors are used for multiple purposes. It seems that the ways the measures of intangible success factors were reviewed and used in the case organizations is similar to those for any other performance measure. The difference between using measures of intangible success factors and other measures seems to be not how they are used but what issues are managed using them. For example, competencies or international relationships of employees cannot be managed using productivity or profitability measures. Thus, the almost self-evident conclusion is that the measures of intangible success factors make it possible to

use measurement information (and the measures themselves) as a tool in managing intangible success factors.

As measurement highlights the importance of the factor being measured (see e.g. Neely, 1998b, p. 56; Uusi-Rauva, 1996a), some of the measures of intangible success factors at the case organizations had generated actions although the measurement results had not even been calculated yet. Therefore, an important success factor may be worth measuring even using a deficient measure if better possibilities are not available (Hannula et al., 2002, p. 164; Stivers et al., 1998, p. 48). Thus, the quality of the information that the measures provide may not always be the main criterion for the usefulness of the measures. It may be sufficient to have deficient measures in the early phases of using a measure which can later be improved.

9.1.1.6 Q6: What are the main challenges in the using phase?

Subjective measures seem to capture well the intangible success factors. For instance, qualitative information, e.g. the open questions in questionnaires, was considered especially useful. However, subjective measures may not always reflect the objective reality and they may lack the sophistication that would allow focusing on improvement. Objective measures of intangible success factors may be problematic as regards validity and relevance. Therefore, they may not be considered managerially relevant. On the other hand, even deficient measures may be useful in guiding activities. Despite these generalisations, certain individual measures of both types were considered useful while others were problematic in practice. The operative measures of intangible success factors were considered especially useful. While the operative measures were the most useful, it seems that measures describing the effects of activities and the competencies of employees were often more problematic and, thus, considered not useful. From the point of view of the experienced usefulness of a measure, more important than the format of the measure is that it provides managerially valuable information or guides activities.

9.1.2 *Primary research questions*

9.1.2.1 **RQ1: How can intangible success factors be measured?**

The discussion regarding the secondary research questions Q1, Q2 and Q3 provided most of the answers to the first primary research question. That information is here supplemented with the key results that are related to measurement of intangible success factors across all three phases.

The phases of measuring intangible success factors were iterative. Many implementation-related decisions are made during the early design phases. For example, how accurately and narrowly a success factor is defined affects the choice of what kind of measures can be used. Further, the choice of different measures directly affects how they can be implemented and used. On the other hand, it seems that the final designing of the measures occurs only during their implementation. Thus, in practice, it is quite hard to separate the different phases of measuring intangible success factors. This is likely to be similar with most performance measures (cf. Bourne et al., 2000, p. 758; Kaydos, 1999, p. 192).

The soundness of the measures of intangible success factors can be assessed in various phases. When choosing the factors to be measured at the case organizations, the soundness of measurement was assessed with respect to overlapping of the factors, the measurability of the factors and the possible effects of measuring compared to some other activity. During the defining of the measures, the soundness of measures was assessed mainly regarding validity and practicality. An important determinant of practicality was the availability of information systems that provide the data for the measures. Although some measures were considered sound in the design phase, the implementation phase revealed problems in them. Thus, practical experience of applying the measures was needed in order to be able to fully assess the soundness of the measures. On the other hand, it is possible to redesign better measures based on assessing the soundness of measures in any phase. The assessment of the soundness of the measures seems similar to what was expected on the basis of earlier literature (e.g. Hannula, 1999, p. 78; Kaydos, 1999, p. 192) and the model presented in Chapter 5.3.1 (Figure 37). However, the case studies provided detailed information regarding how it is done in practice.

In conclusion, the measurement of intangible success factors is in many ways similar to measuring any other success factors. The most characteristic traits in measuring intangible success factors include the following. First, there are not many well-established intangible success factors that are measured in common in different organizations. In comparison, many of the tangible success factors are common across companies. These factors include, e.g., profitability, delivery accuracy and product quality. Also some of the intangible success factors, e.g. customer satisfaction and employee competencies, are common in different organizations. However, they include many differences, depending on each situation. The situation seems to be similar regarding many of the measures of intangible success factors. Second, many of the measures of intangible success factors are subjective, although objective measures are also used. This is different from the case with tangible success factors, which are measured mostly using objective measures. Third, some relatively new management tools related to intangible success factors, e.g. competency matrices and customer surveys, act as information sources for the measures. The existence of such systems is a prerequisite for some measures of intangible success factors.

9.1.2.2 RQ2: What are the main challenges in measuring them?

The measures of intangible success factors that were used in the case organizations covered only a small part of the factors that were initially identified as important. Thus, the practice seems to correspond well with what was expected (cf. Stivers et al., 1998; Chapter 5.3.1). This is due to certain gaps between the phases of measurement. First, not all intangible success factors that were first identified as important are actually chosen to be measured. Second, not all factors chosen to be measured can be measured because of problems in designing and implementing the measures. Third, some measures used do not lead to any actions. The problems in measuring intangible success factors are presented in Table 30. They are, in addition to other problems, the causes for the gaps mentioned. Also the problems that are common in applying any performance measures, e.g. lack of resources, are present in measuring intangible success factors.

Table 30. Challenges in various phases of measuring intangible success factors.

Phases of measuring intangible success factors	Challenges and some possible issues causing problems
Design	<ul style="list-style-type: none"> - transforming the immaterial and vague intangible success factors into measurable form, - balancing between the need to define factors narrowly in order to be able to measure them objectively and still receive managerially relevant measurement information, - trying to measure factors that can better be influenced using other means than measuring, - finding the skill and time required to design subjective measures and - designing data collection methods for various immaterial phenomena
Implementation	<ul style="list-style-type: none"> - difficulty and laboriousness of implementing subjective measures, - resources consumed by the development of data collection methods and - inadequate definition of the measures of intangible success factors during the design phase
Use	<ul style="list-style-type: none"> - lack of correspondence between subjective measurement results and objective reality, - lack of sophistication of subjective measures that would allow focusing on improvement and - problems with validity and practicality of objective measures which may make them managerially irrelevant

Figure 43 below shows how the coverage of the intangible success factors decreases during the design, implementation and use phases. The reasons for the phenomenon have been described above. However, the situation is probably not as pessimistic as it may at first appear. First, the coverage is not likely to decrease to zero, i.e. the measures may not be perfect, but they can probably capture at least a part of the intangible success factors. Second, it is likely that the measures can be improved in the future when there is more experience of using them and when more sophisticated measurement solutions can be developed. In Figure 43, the dash line represents an optimistic view that the coverage can be improved as the measures are updated or improved. On the other hand, the coverage can also decrease if the measures are not developed and updated to correspond to changing requirements. Naturally, the further improvement of the measures requires resources.

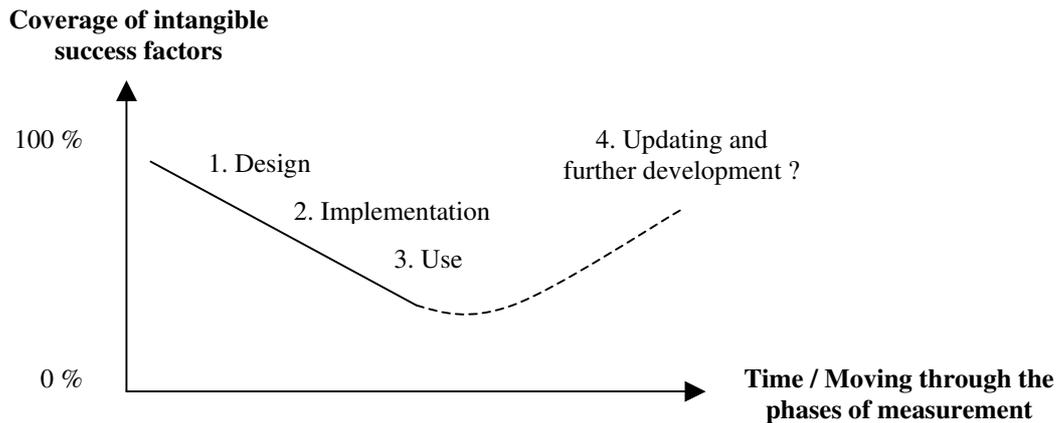


Figure 43. Changing coverage of the intangible success factors.

It seems likely that the model presented in the figure above also applies to other measures than the measures of intangible success factors. However, that assumption cannot be verified because it was not examined in this research.

9.2 Contribution of the research

9.2.1 Contribution to prior research

Earlier research has identified that measurement of intangible success factors is difficult to carry out in practice (Dion, 2000, p. 36; Hannula et al., 2002; Lönnqvist, 2002; Neely et al., 2002, p. 18; Nordika, 2000). Organizations have reported that they do not know how they should measure their intangible success factors (Nordika, 2000) and that they have difficulties in designing measures of intangible success factors (Lönnqvist, 2002; Neely et al., 2002, p. 18). Many frameworks have been developed for measuring intangible success factors. However, these frameworks have not provided a solution for the biggest problem: how to design individual measures of intangible success factors? In fact, there has been a lack of research at the level of designing individual measures.

This study contributes to prior research by describing how individual measures of intangible success factors have been designed in three case organizations. It also provides more detailed knowledge regarding the specific problems that are related to designing measures of intangible success factors.

The phases of designing, implementing and using performance measures in general and the challenges related to each phase are well known (cf. Bourne et al., 2000 and 2003; Hacker and Brotherton, 1998; Institute of Management Accountants, 1998; Leinonen, 2001; Lönnqvist, 2002; Neely, 1998a; Simons, 2000). However, there was a lack of specific knowledge regarding different phases – especially implementing and using – of measuring intangible success factors and the specific problems related to those phases. Thus, this study contributes to earlier research by providing new knowledge about the different phases of measurement of intangible success factors and the specific problems related to those phases.

In addition to gaining new information about the different (separate) phases of measuring intangible success factors, the longitudinal examination provided new information regarding the interaction between the different phases of measuring intangible success factors. In fact, it was discovered that some of the problems in implementing and using measures are caused by decisions made during the earlier phases themselves.

The definitions of the key concepts related to the measurement of intangible assets were obtained as a result of the conceptual analysis. The contribution that this makes is the integration of the concepts related to the traditional performance measurement literature and the more contemporary intangible assets literature. In the theoretical framework of this study, the researcher also aimed at assessing different measurement frameworks and approaches that have been presented in the literature. Some of the properties of various measurement frameworks have been integrated regarding the designing of intangible success factors. The theoretical framework makes a contribution by presenting a consistent set of concepts and their definitions as well as an assessment of the various approaches available for measuring intangible success factors.

From a methodological point of view, this study has made a contribution by applying a new type of approach to studying intangible success factors. The longitudinal case examination of the different phases of measuring intangible success factors has not been previously applied in a similar research context, i.e., regarding the research on measurement of intangible success factors. Also the focus group method has not been previously used in studying the measurement of intangible success factors. These are not new research methods as such. However, they have not, to the author's knowledge, been applied in the same context. The description of applying the research methods makes it possible for other

researchers to assess the usefulness of the approach used in studying intangible success factors.

This research did not provide any groundbreaking results. However, that was not the objective. The goal was to provide more detailed knowledge regarding how the measures of intangible success factors are designed, implemented and used and what kind of problems are related to those phases. In conclusion, this research has made a small but relevant and valuable contribution to prior research by achieving its objectives.

9.2.2 Contribution to management practice

A key starting point of this study was the practical problems in measuring intangible success factors. Therefore, it is justified to discuss the contribution of the study also from the point of view of practical management. The following points present the main contribution of this research to management practice.

First, the theoretical framework of the research presented and assessed several different approaches for managing intangible success factors. The presentation of the different frameworks is too compact from the point of view of applying them in practice. However, managers (or who ever needs the information) can use the presentations as a starting point when assessing which framework would be best suited for their purposes.

The second practical contribution is that the results of the study leave managers better informed on how to design, implement and use measures of intangible success factors. The results regarding each phase of measurement describe the specific aspects of measuring intangible success factors. Also the practical descriptions of how the phases have been carried out at the three case organizations can be used as a reference when similar issues are encountered in other organizations.

The final practical contribution of the study is the identification of the specific challenges in measuring intangible success factors. When challenges are known beforehand, it is possible to prepare oneself before they actually cause problems. For example, it is possible to

allocate more resources to designing subjective measures and to developing methods for collecting the measurement information.

9.3 Assessment of the research

9.3.1 General assessment

This study is assessed on the basis of four criteria: relevance, validity, reliability and generalizability. These are commonly used criteria for assessing the quality of research (see e.g. Gummesson, 2000, p. 185; Kulmala, 2003, pp. 111 - 114). However, first some general comments about the study are presented.

The choice of the research approach and methods has been explained in Chapter 1.5. With hindsight it can be stated that the choices have been appropriate. For example, using different methods in order to be able to examine different phases of measurement proved useful: some of the problems in implementing and using measures were caused by decisions made in the earlier phases and they might not have been noticed if only separate phases had been studied.

Some words of criticism can also be stated regarding the study. To begin with, the methods of studying the use of the measures were suitable as such. However, the results might have been more informative if the examination had taken place when more experience had been gained from using the measures. For example, the examination could have been carried out after one or two years. Because of the practical limitations regarding funding and the schedule of the research project that provided the research material and most importantly the access to the case organizations, it was not possible to gain more experience of the using phase. The research regarding the use of intangible success factors is the most problematic part of this research. Its implications for the validity and reliability of the research are discussed in the following sections. However, the new information can be considered valuable despite the problems that it includes. The value can be based on two reasons. First, it completes the design and implementation phases. In this way it was possible to reflect on the previous phases (design and implementation) and assess the sensibleness of the measures that have been developed. Second, there is a lack of research regarding the use of

intangible success factors. Therefore, even somewhat deficient information is an improvement on the present situation.

Also the action research and the interviews were considered suitable methods for this study. However, the decisions made during the design and implementation phases were often intuitive and it was quite difficult to form interpretations and conclusions regarding the research material. Further, the practical application of the research methods, the research material and the analysis included some compromises and considerations that affect the results. They have been discussed case by case as they occurred and, thus, it should be possible to assess their effect on the results. A drawback of using three different research methods was the partial overlapping of the research material produced. This resulted in some repetition in the case descriptions and analysis.

The choice of the research approach used was experienced as beneficial from the point of view of the case organizations. First, the author and his research colleagues acted as facilitators during the design process. This saved the case organizations' resources and provided them with expert guidance for the process. Second, the personnel of the organizations considered the implementation meetings held at the case organization to be positive milestones. The meetings reminded the organizations to continue their efforts in implementing the measures. They also presented a possibility to discuss the problems that had been experienced. Third, the focus groups provided an opportunity to exchange experiences with organizations in similar situations. These benefits are common to case research and especially to action research (Gummesson, 2000). Despite the fact that the research affected positively the organizations participating, it differs from management consulting. The main difference is that management consulting uses existing information to solve problems in practice while research examines practice based on existing theory in order to make contributions to theory (ibid., p. 10).

The results of the conceptual analysis reflect the views of the researcher. Another researcher could have decided that different definitions would be more suitable. Nevertheless, the definitions of each concept are rationalized and thus their soundness can be assessed based on the reasoning. Ultimately, the soundness of the definitions of the concepts, as well as the quality of the conceptual analysis itself, will be judged from the use of these concepts by other researchers and practitioners.

9.3.2 *Relevance*

This research was earlier characterized as applied research. Thus, the research must be able to meet the relevance criterion in order to have some value. In this case, the relevance is based on the following points. First, the success of many organizations depends on their intangible assets in addition to the traditional tangible assets. Therefore, it is important to be able to manage them. Second, there are currently a lot of problems regarding the measurement of intangible success factors in practice. Thus, examining the measurement of intangible success factors may lead to improved tools for managers for measuring the intangible assets. Third, there is a lack of scientific knowledge regarding the problems related to applying measurement as a tool in managing intangible assets. Fourth, the examination of the issue took place at real situations in the case organizations. This made it possible to access the actual factors affecting the research issue in a natural setting. Fifth, many measurement frameworks, e.g. Balanced Scorecard, Meritum Guidelines and Value Chain Scoreboard, include measures of intangible success factors. Thus, the results of the study, i.e. the new knowledge about measuring individual intangible success factors, can be applied within many measurement frameworks. Based on these justifications, the research is relevant.

9.3.3 *Validity*

The validity of research describes the extent to which the evidence reflects the reality under examination (Gummesson, 2000, p. 185). According to Lukka and Kasanen (1995, p. 75), a successful case study should convince the reader of the validity of the case description and analysis. The evidence of a case study is based on presenting the results and how they have been reached in such a way that the correctness of the results can be ascertained (Olkkonen, 1994, p. 54). In this research, the case descriptions have been presented as carefully as the researcher has been capable of. Also, one or two researchers in addition to the author participated in each of the case studies. These researchers have all reviewed and confirmed the case descriptions. Also a representative of each case company has reviewed and confirmed the case descriptions. This should affect positively the way the reader experiences the validity of the research and, correspondingly, the case descriptions should

reflect reality well. The methods of collecting and analysing the research material have also been described. This should make it possible for the reader to assess the correctness of the results. In the end, it is the reader of the thesis who must make the decision regarding validity.

As a whole, the validity of the research is good – both the theoretical and empirical parts of the research focused on the issues that were intended to be examined. However, there are problems of validity regarding that part of the research that examines the use of measurement. This is due to the fact that the use phase was examined too soon after implementation. At the time of examination, some measures had not even been used yet and some measures had been used only a short time. Therefore, the results of the research represent only partially the use of the measures of intangible success factors. The experience and practice of long-term use are, thus, not included.

9.3.4 Reliability

The reliability of the research refers to whether some one other than the author would have obtained the same results if he or she had carried out the research (Gummesson, 2000, p. 185). This seems unlikely in this study because the researcher has influenced the case organizations while carrying out the case studies and especially the action research part. In addition, the qualitative research approach includes interpretation which depends on the researchers judgment. However, these are typical limitations of most qualitative case studies.

Although the size of the sample does not have the same importance in qualitative case research as it does in quantitative research (Gummesson, 2000, p. 89), this is also an issue that should be discussed. It can be questioned whether only three cases provided enough information to produce reliable results. The results may suffer from random error if too few cases are used. In this research, the results regarding the three organizations were mainly similar, which suggests that the number of cases has been sufficient and that the research is reliable. On the other hand, it is impossible to know for certain whether an additional case would have provided new information.

In this study, triangulation has been carried out using multiple data sources, methods and investigators as a means for increasing the reliability of the research. In practice, several researchers have participated the research, several research methods have been used and several sets of research data examined. Although the viewpoints used in the different empirical methods are different (except regarding the using phase, which was examined using two methods), they provide information about measuring intangible success factors from several data sources.

On the basis of the reasoning above, the reliability of the research as a whole is adequate. However, there are problems of reliability regarding the use of the measures of intangible success factors. Because there was so little experience of using the measures, the results may incorporate random error. As mentioned, all measures were not yet in use at the time of examination. Thus, the results may include random error which is caused by the examination situation: the availability of experience of use was quite random, depending on which measures of intangible success factors had been implemented and used.

9.3.5 Generalization

The fourth quality criterion of research examined here is the generalization of the results. As mentioned in Chapter 1.5, generalization in case studies differs from that in statistical studies. The rhetoric of contextual generalization has been presented as a way to move from isolated results to a more general status (Lukka and Kasanen, 1995, p. 75). It means that the results of the study should apply in a context similar to that in which the case studies have been carried out.

It is here suggested that the results could be applicable in situations that are within the limitations of this study, i.e. when measurement is used managerially and in small organizations. In addition to this, some other issues should also be considered. First, all case organizations were knowledge intensive and Finnish. It is not clear whether the results would be applicable in other countries or in other types of organizations. Chaminade and Johanson (2002) have compared Spanish and Swedish companies, and the results of their study suggests that the general cultural differences of countries do not affect the way companies develop the management, measurement and reporting of intangible assets.

However, a precondition for this result is that a company should be a knowledge-intensive organization and this should also be recognized by the organization. Their finding supports the generalizability of the results of this study. Second, the relevance of this study was earlier based on the assumption that the new knowledge about measuring individual intangible success factors can be applied within different measurement frameworks. Thus, this also suggests that the results are generalizable regarding the different measurement frameworks that have been presented in Chapter 3. It is unclear whether the results of this study have any value outside the context of this research setting, e.g. in other than knowledge-intensive organizations. However, these results can be used at least as a starting point for further research dealing with the measurement of intangible success factors in different situations.

9.4 Further development of the measurement of intangible success factors

9.4.1 Reflections on existing theory and empirical findings

In addition to answering the specific research questions, some other issues can be raised for discussion based on the theoretical framework and the empirical results. The discussion is started from assessing the quality of measures of intangible success factors. Various measurement-theoretical issues were discussed in the theoretical framework of the research. Many of the current practical measures of intangible success factors, including the ones presented in the empirical part of this thesis, seem defective from the point of view of the measurement-theoretical criteria, e.g. validity and reliability. On the other hand, it was demonstrated that even deficient measures could be useful for some managerial purposes.

It can be questioned whether certain intangible success factors can ever be measured in such a way that the criteria of sound measurement are fulfilled. Intangible success factors are by nature such that they include several aspects that should be covered as well as subjectivity. Customer satisfaction is a good example of such a factor. The satisfaction of a customer is a result based on the customer's subjective experience regarding various aspects related to the product or service purchased. These different aspects might include price, product features, brand, additional services and so on. It may be difficult to define a measure that accurately captures all of these dimensions. In addition, a certain amount of subjectivity is likely

included in the measure, because it is usually the customer who makes the assessment. These features suggest that the measure is unlikely to be able to provide exactly precise results that correspond to the objective reality.

The managerial context of measurement is an issue that should be remembered when assessing the usefulness of the measures of intangible success factors. Why measure, e.g., customer satisfaction? Usually, the answer is to know the extent to which the customer is or is not satisfied with the product offered and to know which aspects of the product customers are satisfied with and with which they are not. Therefore, managers are likely satisfied with less than completely exact measurement results. In comparison, measurements related to, e.g., physics must be exact. However, a certain level of accuracy of the measures of intangible success factors must also be achieved in order to be able to make any meaningful interpretations based on the measurement results. Another context to be considered is the social one. Intangible assets are often related to relationships between people and organizations, e.g. between supplier and customer or between a researcher and his or her international partner in cooperation. These relationships, including the assessment regarding how well they, work are, again, subjective. It can be questioned whether there actually is any problem in using subjective measures. It was argued that both objective and subjective measures used in managerial context have both advantages and disadvantages. Also practical experience supports the view that both measures can be managerially useful. Thus, the use of subjective measures seems to be justified.

The use of subjective measures has interesting implications for defining what performance measures are, what other managerial tools are and whether the two can be the same thing. Typically, performance measures are presented in the form of management ratios, e.g. quality costs are presented in monetary values or as a percentage of sales. However, in the case of the measures of intangible success factors, certain management tools and processes can be considered performance measures as such. For example, the case organizations of this research examined the customer satisfaction surveys and the time management tools as the performance measures. Also qualitative information, e.g. provided by open questions on a questionnaire, was considered useful. When a performance measure is defined as the means for determining the status of an attribute or attributes of a measurement object, it does not seem important whether a measure is something that produces a single figure or

several different results describing different aspects of some phenomenon or whether the information produced is qualitative or quantitative.

In the theoretical framework of the research, various measurement approaches were reviewed. Also the properties of various measurement frameworks, mainly from performance measurement and intangible assets discourses, were integrated in order to determine how the measures of intangible success factors could be designed. It was stated that there is a lot of overlapping in the different measurement frameworks, and also in the work done, across and within the two discourses mentioned. Therefore, it would seem rational to try to integrate the two discourses even more. The work carried out in this research may be of help on the way.

Management fads seem to come and go. The management and measurement of intangible assets has been on the topical management and research agendas for less than ten years. The topic is still quite young and it is, therefore, difficult to predict the direction in which it will be developed in the future. Knowledge-intensive work seems to be becoming more and more common in the information societies of today. This would suggest that at least the importance of managing intangible success factors will remain high also in the near future.

9.4.2 Areas for further research

There are many opportunities for further research regarding the measurement of intangible success factors. In general, more research on the measurement of intangible success factors should be carried out in order to provide additional evidence for the results of this study and to examine other issues that this study did not cover. For example, in this study, the use of measures of intangible success factors was examined only shortly after they were implemented. Studying the using phase during a longer time period or at least after more time has past since implementation might provide more insight into the issue.

One important problem is that there are no existing measures for certain intangible success factors or the current measures are not experienced as useful. Thus, new measures of intangible success factors should be developed and their usefulness in practice should be tested. Specific factors for which measures are needed include, but are not limited to, e.g.,

those that were identified as important in the case organizations but could not be measured. They include *flow of information, knowledge sharing* and *effectiveness of organization's activities*.

Once the measures of intangible success factors used in organizations have produced volumes of measurement data, the data itself can be used as research material. This may make it possible to apply statistical research methods. Managerially relevant research questions include, e.g., which measures of intangible success factors and which intangible success factors predict financial results, how do the flows or causal relations between intangible success factors occur, what kind of time lags are there between investing in intangible assets and the improvement of operational efficiency or financial results?

It seems that the research issue of the measurement of intangible success factors will be topical for some time in the future. For example, the valuation of an organization's intangible assets in connection with corporate acquisition requires measurement. Currently, this is still quite challenging. The various development activities, e.g. investments in information technology, carried out in organizations are expected to produce various effects. Some of the effects are likely to be tangible, e.g. reduced costs, and some intangible, e.g. improved customer service or employee satisfaction. Verifying the effects may provide new targets of application for the measurement of intangible success factors. It seems possible that the measurement of intangible success factors could be developed into a versatile tool that can be used in supporting various organizational activities outside of the currently dominating measurement system context.

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