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**THE EFFECT OF INTANGIBLE ASSETS
ON THE IT CRISIS**

Perspective of Swedish IT Companies

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Abstract

The fair valuation of a company has been questioned for many years. It becomes even more challenging when it is the IT companies to deal with. Reasons behind this problem stem from the valuation of *value creating factors of intangible assets*. The most current example that showed the need and importance of a solution to this issue is *the IT Crisis*.

In this thesis, we focus on the effect the value creating intangible assets had on *the IT Crisis*, which we examined between 1997 and 2001. We identify the framework of a crisis followed by the concepts of intangible assets. The changes that occurred during the IT Crisis and whether these changes affected the IT Crisis are discussed. There are two kinds of intangibles that have been found, which consist of *reported and unreported intangibles*. The interesting fact is that there is value attached to intangibles. Moreover, there are still no generally accepted value measurement methods and accounting rules for some intangible assets. We will introduce three *Swedish IT companies*, which are listed in the Attract-40 List of the Stockholm Stock Exchange and base part of our analysis on the 'Four Resources of Categories of a Firm' by Barney (1997). These companies will be looked upon based on their intangible assets, reported and unreported, and the changes in their value during the IT Crisis.

Our findings indicate that the value of intangible assets was set too high. As a matter of fact, as long as the accounting principles do not change, one can never value those intangibles appropriately.

Keywords

Value creating factors of intangible assets, the IT Crisis, reported and unreported intangible assets, Swedish IT companies.

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1 CHAPTER ONE – INTRODUCTION

The aim of the first chapter is to present our subject area by giving a background to it followed by our problem discussion. Then we will discuss our purpose and who our reader is. Lastly, the delimitations of our thesis will be presented.

1.1 BACKGROUND

This thesis is focused on the value creation factor of intangible assets in IT companies operating in Sweden. Swedish IT companies are subject to investigation due to the fact that Sweden was ranked as one of the world's leading countries in the information technology sector in comparison to other countries such as UK and France (Carlberg, Leimalm, 2000, p.2). The IT boom & bust period (1997-2001) will be the time frame of the investigation; since the thesis aims to detect the value creation factor of intangible assets, which was truly demonstrated during this period.

Information technology has some factors that fascinate us in a way. In every walk of our lives, information technology plays an important role, whether it is the master thesis, which has to be written through a word processor and e-mails, or a conversation being made via a mobile through extensive distances. Being born into the era of information technology, it is nearly impossible to live without it.

The IT crisis is an interesting period that we would like to examine. During the last century, there had been similar boom and bust periods that occurred during 1840's and 1850's, which makes understand that the concept of boom and bust is nothing new. However, the most current of all, the IT crisis, is the only crisis that makes one think about the problem of value creation and measurement of intangible assets in companies (especially IT companies). Keeping this perspective in mind, it is not only interesting to look at what has happened during the IT crisis, but it is even more interesting to see what can be learned and developed from this experience.

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There are lots of technological developments going on within the IT sector such as the mobile entertainment market. Every single day is full of technological surprises. When we started this thesis, big exhibitions, such as the technology exhibition in Hanover, Germany; were demonstrating mobile phones, which were able to take photos. In less than half a year, in December, 2002, it is now possible to send live recordings to any corner of the world through a mobile phone. Due to these developments, investors, analysts, academics and others will have some market expectations as far as the information technology sector is concerned. Consequently, this might lead to another boom & bust.

Coming to intangibles...Basically intangibles are assets which are not physical, such as the organizational structure of the company, the knowledge and talent of the personnel, patents, trademarks, copyrights, R&D investments, goodwill, culture and so on...During this thesis, we will separate the intangible assets into two different groups: the ones which are valued, measured and reported and the other ones which are basically not reported. We decided to take this approach, since this thesis is focusing on the value creation issue of the intangible assets and this will create an analysis approach, which will be followed.

1.2 DEFINITION OF IT COMPANY

There are so many companies that are categorized under information technology. But what is meant by Information Technology? According to Carlberg and Leimalm (2000), Information Technology can be understood most frequently as a sector, which consists in part of the industrial sectors, which manufactures computers and telecom equipment. However, within the service sector, the IT industry is regarded as working with software, support, consulting, sales and other IT solutions. In accordance with the OECD, Carlberg and Leimalm (2000) also state that IT can be categorized under the production of hardware and the production of information technology services. Industry sector within the high-tech as well as the biotechnology are also grouped under information technology. Most of the time, we find that their distinctions from other IT companies are characterised by their development in technology.

1.3 SWEDISH IT SECTOR

The early deregulation of the telecommunication market in Sweden has led to lower prices and the possibility to offer a large variety of innovative services. The infrastructure is well developed and new technologies are widely used in the private business and state sectors. A long tradition of engineering and innovation has ensured that Sweden is a world leader in wireless communication and Internet use:

Being offered a great choice in a competitive market, Swedes are making greater use of telephones, cellular phones and telephonic services than any other European country. The large majority of people working in Sweden have access to computers and Internet at work. The number of people with access to computers at home is also well above the EU average. Nearly all companies have an Internet connection and many are engaged in conducting e-business.

According to Erkki Liikanen (2002), commissioner responsible for Enterprise and Information Society in the EC, “the EU has recently set a target of reaching %3 of GDP as R&D spending and in this area, Sweden clearly stands out as top of the class as it invests %3.8 of its GDP in R&D whilst the EU average is %1.9”. In 1999, according to the European Information Technology Observatory, Sweden was ranked first in the world in investment in IT and telecommunications: R&D spending was %3.7 of GDP, while the corresponding same number was %3.1 in the US.

Furthermore Liikanen states that, “all this puts Sweden in a good position to withstand the negative effects of the current downturn of the economy and to be able to prepare for the future when the current downturn ends. The image that Sweden has in Europe as an ‘IT nation’ is truly well earned and justified”.

1.4 PROBLEM

The objective of the thesis is to find out what can be learnt from the boom and bust from the perspective of, how the value creating factors of intangibles affected the IT crisis. The reason behind is that there is something that we do

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not know today and would like to know about and can be learnt from the boom and bust period.

There are several reasons why share prices have taken such a volatile shape in the Swedish IT sector. Many companies were acquired, whereby after the acquisition stage, the market value of the company was not the same as the book value. This is due to the value given to the intangibles in IT companies. In other words, intangible value has played an important role that contributed towards the volatile movement of the IT sector.

Then, we would also like to learn whether the importance given to intangibles have changed over time, whether this has exercised an important factor towards the IT boom and bust. To further delimitate our thesis, we would like to identify intangible factors, which has created value for IT companies. For that purpose, we would like to conduct a study of what we can learn from IT companies in terms of their value creating intangible factors. We will be focusing on the boom and bust period in 1997-2001.

Considering these research problems, our main objective is formulated as follows:

- Main Problem -

How have the value creating factors of intangibles affected the IT crisis in Swedish IT companies?
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This research will be done with focus on Swedish IT companies. In order to answer our main problem, we have created sub problems: First, we would like to identify:

- Sub Problem I -

What are the value creating intangible factors of Swedish IT companies?

Once we identify the value creating intangible factors, we would like to know, whether there are any changes that have taken place:

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- Sub Problem II -

Did these factors change during the IT boom & bust period?

Once we have researched these issues, we will be answering:

- Sub Problem III -

Have these factors contributed towards the IT boom and bust?

There are different ways to achieve our objective. Our research method will be introduced in the following chapter. Then, in the third chapter, we will be illustrating literature written about intangible assets. In the fourth chapter, we will identify the concept of financial crisis followed by the developments of the IT industry during the financial crisis of 1997-2001. Based on this research, we will be focusing on three Swedish IT companies: IFS, Micronic and Telelogic: We will introduce these companies based on Barney's source capital theory followed by the identification of their value creating intangible assets and the changes which occurred in these assets between 1997 and 2001. This analysis will also be based on the interviews made with the companies. Finally, we will be concluding our research by giving an explanation of; how these factors had an impact in the IT crisis.

1.5 PURPOSE

The contribution of our thesis is that we have investigated the Swedish IT crisis between 1997 and 2001 and found that value creating intangibles have an impact towards the IT crisis. Furthermore, our contribution is to offer an insight and an in-depth perspective of intangibles, reported and unreported and how they have affected the Swedish IT companies IFS, Micronic and Telelogic during the boom and bust.

The main reason, why the IT boom and bust has occurred is the fact that investors and analysts have overvalued IT companies. Since the companies cannot sustain their value, share prices fell because everything was hyped up. Now, the fact we know is that the majority of IT companies are made of intangibles. The problem is that one does not really understand what is meant

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by value creating intangible factors. If these factors were fully understood, it would have not come to the point, where share prices were overvalued.

In order to understand how to evaluate IT companies “properly”, one has to understand what is meant by value creating intangibles. Therefore, in our problem definition, we will first identify the value creating factors. It also supposes to help one to understand their significance and their effect towards the IT crisis.

We believe that we can make this contribution due to the fact that we have time to reflect upon what has happened during the IT crisis while analysts on the other hand have a demanding workload, which may not allow them to have the opportunity to reflect upon this issue.

In addition, the IT industry represents a popular investment portfolio for analysts especially during the boom and bust period, where large amount of earnings and losses have been made. Hence we found that it is important to conduct our study in such a significant sector.

1.6 DELIMITATIONS

This part of the thesis aims to define a scope and limitations into the thesis. These limitations can be summarized as four main factors described below.

The thesis is limited to Swedish IT companies. The main reason is that the Swedish IT industry was ranked first in the world in investment on IT and telecommunications in 1999. Since the subject of our thesis is the IT industry and the value creation of investments in this particular sector, in that sense, taking Swedish companies as investigation purposes can possibly increase the external validity of this thesis.

The thesis also investigates a specific timeframe: 1997 to 2001. As already mentioned, the aim of this research is to understand to what extent value creating intangible factors had impact on this period of time.

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We will examine the IT firms listed in the O-List. The O-list represents companies from the Attract 40 List of the Stockholm Exchange.

It is also important to remember that we can only investigate IT companies, which are still in business up to present day. Therefore, this thesis is not going to focus on why IT companies have failed in the past as the likelihood is high that there would be very little information available on that subject when empirical research had to be carried out.

1.7 READER OF THE STUDY

This thesis is aimed at potential investors and analysts interested in IT stocks. The IT boom and bust period has marked a significant period in portfolio performances. It can be understood that analysts are, according to the financial theory of the Capital Asset Pricing Model, (Megginson, 1997) risk adverse. They would like to have a return with the minimum risk required. If analysts wanted to invest in IT stocks, then they would like to evaluate the company in terms of their risk, such as that they would also like to see a future that is less volatile than during the boom and bust period.

2 CHAPTER TWO - METHODOLOGY

This chapter aims to present the reader with an outline of how the thesis is carried out. First, it will provide a research perspective based upon literature studies in the field. Then the data collection methods comprising primary and secondary research as well as data validity will be discussed. We will be using concepts from Yin (1994), Merriam (1998) and Remenyi et al (1998).

2.1 RESEARCH APPROACH

The thesis aims to investigate a research area as defined during the problem discussion. However, in order to do so there are several research approaches, which have to be looked at. According to Yin (1994, p.14), there are three research approaches, namely the descriptive, the explanatory and the exploratory. Each of the methods has its distinctive characteristics, where large areas of overlaps can be found among them. Yin (1994) states that the most important condition to differentiate among those research strategies is to identify the type of research question, which is asked when conducting the investigation.

The descriptive approach is a study, where extensive knowledge and research issues have been carried out on the subject area. The aim of the descriptive approach is to describe such an issue or the characteristics of the subject area.

The explanatory approach is used when one ask the questions "how and why something has happened". Usually, the explanatory approach leads one to use case studies, histories and experiments. Furthermore, this research approach is used because such questions deal with operational links needing to trace over time rather than mere frequencies or incidence.

The exploratory approach provides knowledge into the subject field. Usually, questions asking "what?" are exploratory (Yin, p.5).

Our thesis will be both descriptive and explanatory. From a descriptive point of view, the thesis will identify the value creating intangibles of the Swedish IT companies. However, the explanatory approach will be used when we assess how they have changed over time and explain how value creating factors have contributed towards the IT crisis. Our thesis aims to provide a suggestion on the learning process of the IT crisis; hence the way it is going to be approached is therefore analytical and explanatory. Since this study aims to explain why and how and what has happened the way it happened, it fits into the definition of Lekvall & Wahlbin (1993), about the analytical or explanatory approach.

2.1.1 Qualitative and Quantitative Methods

Firstly, in order to provide the reader with thorough research, it is thought that it is important to consider both qualitative and quantitative studies within our research methodology. The reasoning behind for this is that qualitative data would show the reader, how much in depth the topic has been researched while quantitative data allows us to define the scope of the topic area. Based on both qualitative and quantitative studies, we would like to show our reader that our recommendation is not based on subjection, but on the objective approach.

2.1.2 Abduction, Deduction and Induction Methods

There are two ways in which our research problem can be solved. Remenyi et al. (1998) have described two methods, the induction and the deduction method.

The inductive approach aims to draw general conclusions from the observations made. In other words, assumptions are formed according to the observations, which are conducted during an empirical investigation. The deductive method however, uses hypothesis and theories, which then are going to be tested in the empirical world. Howard and Sharpe (1983, Remenyi et al. 1998 p.106) suggest that the deductive method can be adopted to generate research topics. This can be conducted by getting ideas from articles, journals, reviews, books and media to communicate with experts and researchers.

There are advantages and disadvantages by using one or the other approach. For instance, the inductive method depends on the observations, which are carried out during the empirical investigation. Though, the question has to be addressed, to what extent the observational data are reliable and trustworthy. Depending on the observations, assumptions are going to be drawn. Vice versa, by using the deduction method, the problem that can occur is the question of validity, when deducing empirical evidence. The point is that the theory can be applied to many different cases at the same time.

Whatever approach is used, it is essential to have a good idea of the conceptual framework, in which the research will be conducted (Remenyi et al., 1998).

One of the more common ways to tackle the research problem is to use the abduction method. The abduction method moves between the empirical world and the theoretical world. During the whole thesis, theories and frameworks such as Barney's framework have to be used to analyze the companies. However, our task is also to identify value-creating intangibles, which requires us to make some "observations" from empirical studies to induce some assumptions. Therefore, the logic of our thesis follows the abduction method, which tries to give a more comprehensive picture of our studies.

2.2 DATA COLLECTION

This section describes the way different data were collected for the thesis. Both primary and secondary research has to be considered. According to the case study research of Merriam (1998), primary research is required to have specific questions answered, whereby secondary data are previously published materials. Primary data is required as it consists of specific information, which cannot be retrieved from secondary data.

On the other hand, secondary research involves using existing sources such as literature, journals, books, annual reports and Internet if required. It must be said that secondary research is important and complements the primary research. Secondary research provides a reliable source of information and is less subjective than primary research, where the investigation can be a bit

biased. Secondary research also offers a broader knowledge base towards the subject area.

We use both primary and secondary data. Primary research was mainly used in telephone and personal interviews with companies since this part addresses specific questions, which are not stated in the annual reports of a company. The study of the annual reports is considered to be secondary research, which will lead us to spot the vital factors of intangibles in the Swedish IT firms. Accordingly, interviews will be conducted in order to question and verify the patterns identified earlier in the process.

2.3 CHOICE OF COMPANIES

Three Swedish IT companies were selected for the thesis study. These companies are listed in the Attract 40 of the Stockholm Stock Exchange. The reason why only three IT companies are chosen is to achieve a proper study. If one covers a wider range of cases, less time will be devoted to each case (Wiedersheim-Paul and Eriksson, 1991).

The basis for selecting these companies was that they were Swedish companies with a high level of R&D. Further explanations will also be given during the empirical chapter in terms of level of R&D. The criteria were, firstly, that they were leading companies within the Swedish IT sector. Secondly, they also had global businesses, which meant that they demonstrate global focus (vision, mission and strategy). This is particularly important as Swedish IT companies represent one of the world's leading companies in Information technology. Thirdly, the three representative companies were not in the same business line. For instance, IFS is a component based technological leader, while Micronic focuses on development of laser pattern generator. Telelogic, on the other hand, develops solutions to organizations, which develop large, complex software systems. Due to these criteria, a more enhanced study to our research problem can be accomplished.

2.4 INTERVIEW METHODS

During the whole data collection procedure, interviews have provided us with the most important source of information. The people interviewed were members of Board of Directors, directors of Investor Relations and directors of IPR departments. They have also long experience within the company, which vary from five to nineteen years. This ensures us that we are communicating with people, who are in the best position to answer our queries.

An introduction mail was, firstly, sent to the correspondents. Depending on their responses, follow-up phone calls were made to ensure that we would speak to the right person and to set a time for the interview. Prior to the interviews, interviewees were informed by e-mail about the topic area given a rough guideline in what will be asked.

2.4.1 Different Types of Interviews

According to Merriam (1998, p.74), there are three ways in which interviews are structured:

- Highly structured: The wordings of questions are predetermined and the order of those questions is also predetermined. It represents an oral form of a survey.
- Semi structured: Semi structured questions consist of a mix of more or less structured questions.
- Unstructured: These are open-ended questions and are more flexible, exploratory, which can be viewed more as a conversation.

The most common way to conduct interviews is to determine, to what extent one requires the amount of structure. There are advantages and disadvantages towards the different types of the interview structures. Usually, a highly structured interview can be regarded as a survey. The disadvantage of using such a method is that predetermined questions do not give the opportunity of

the interviewee to express his or her perspective (Merriam, 1998, p.74). The semi-structured interview comprises a mixture between the highly structured and the unstructured. Questions can be both flexible and structured. The unstructured interview is open-ended and can be regarded as a conversation. It is mainly used when one aims to address questions, which are exploratory and whereby the researcher does not have enough knowledge to ask specific questions (Merriam, 1998, p.74). However, since we have conducted secondary research prior to the interviews; interviews were conducted semi structured to achieve a mixture of results.

2.4.2 Duration and Procedure of the Interviews

The duration of the interviews was approximately up to one hour and it covered questions generally addressed to the company, which related to the IT crisis and how that specific company was handling the crisis. Since our problem discussion deals with value creating intangibles, questions were asked to the interviewees to define what is meant by intangibles in regards to their companies. The interview covers several parts such as general to specific questions, which are called in-depth interviews. Interviews were semi-structured, which means that it holds some structure, mixed more or less, however it was open-ended so that the interviewed person can express his or her opinion more freely. In addition to the questions, which were asked, complementary questions were raised to give a better focus to the interview. Interview answers were written down immediately and where we had the opportunity; the questions and answers were sent to the person to check for corrections so that amendments could be made.

The interviews will be analyzed according to our problem formulations and Barney's framework (1997) in order to identify similar and different responses from various people. The responses will be summarised in the empirical chapter. In order to construct the validity about the collected data, the positions held were considered such as in which area they worked and the amount of years spent with the company. The interviewees come from different backgrounds of field area in order to gain a broader picture.

2.5 VALIDITY

Validity states to what extent our study reflects the measurement, which we are intending to measure. Therefore it is important to consider, which theoretical models we have applied and which data we have collected for our empirical research. “Because a research design is supposed to represent a logical set of statements, you also can judge the quality of any given design according to certain logical tests.” (U.S. General Accounting Office, 1990, Yin, 1994 p.32)

Yin (1994) concludes that there are four tests, which have been commonly used to establish the quality of empirical social work. These are summarised as construct validity, internal validity, external validity and reliability.

2.5.1 Construction of Validity

According to Yin (1994, p.34) there are three ways, in which one can increase the construction of validity. These are the use of multiple sources of evidence, the establishment of a chain of evidence and the draft of report reviewed by key informants.

All three methods were used to increase the construction of validity. Questions and answers from the interview were sent to the correspondents to check for errors and for further addition where it was possible. We also asked external people to proof read our thesis to see, whether it flows and follows a logical pattern.

2.5.2 Internal Validity

Yin (1994, p.35) states that internal validity concerns mainly casual or explanatory case studies. Internal validity should show whether or not the researcher has measured what he is supposed to measure. Therefore it is important that a connection between the empirical world and that of the theoretical world is shown. The task of the thesis is to tell the reader not from a subjective, but from an objective viewpoint. In order to achieve that, our focus

point will be investigated from different perspectives. If this still leads us to our recommendation, we will then have fulfilled the internal validity of our claim.

2.5.3 External Validity

The test of external validity deals with the problem of knowing, whether the finding of a study is possible to generalise beyond the immediate study (Yin, 1994, p.35). In order to increase our external validity, Merriam (1998) suggests that a common way to attain this is by researching through numerous cases. Therefore, our intent is to research three Swedish IT companies from the Attract 40 O-list. We would like to give some findings and apply these findings to make overall conclusions.

2.5.4 Quality of Research Validity

In regards to the research quality, it can be said the thesis aims to be as much transparent as possible. There are ways to ensure that our thesis can be reliable and valid. According to Merriam (1998), it is a matter of how the thesis is designed, how the empirical research is conducted and how analysis and conclusions are carried out. As a matter of fact, the thesis should be traceable, i.e. questions can be asked regarding how we come to a certain conclusion and hence rational answers can be given in order to validate our argumentation.

2.6 RELIABILITY

The objective of reliability is to assure that if at a later date, an investigator followed the same procedure as the earlier investigator, conducting the same problem all over again, he or she would come to the same findings (Yin, 1994, p.36). Yin (1994, p.37) suggests that one way of approaching the problem of reliability is to make many steps as operational as possible. The thesis is delimited to three Swedish companies with different businesses operating in the Information technology sector. When interviews were conducted, we ensured that there were no disturbances so that the interview could be carried

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out freely. The interviews were conducted in a similar way for all the correspondent companies, which follow the same interview approach. Questions were formulated in a straight way, which are perceived to be easily understood to avoid any misunderstandings.

3 CHAPTER THREE - FRAME OF REFERENCE

This chapter introduces frameworks, which are used for our analysis. It will introduce discussions to different concepts of intangible assets. We will be using theories, such as Penrose (1959), Barney (1997) and Lev (2001).

3.1 DEFINITION OF INTANGIBLE ASSETS

“Intangibles are not a new phenomenon. From the dawn of civilization, whenever ideas were put to use in households, fields and workshops, intangibles were created. Breakthrough inventions such as electricity, the internal combustion engine, the telephone and pharmaceuticals have created waves of intangibles” (Lev, 2001, p.11).

3.1.1 Theories on Intangible Assets

Intangible assets can be understood as assets, which are “non-physical sources of value (claims to future benefits) generated by innovation, unique organizational designs or human resource practices. Intangibles often interact with tangible and financial assets to create corporate value and economic growth” (Lev, 2001, p.7).

Assets are claims to future benefits, such as, interest payments from bond or cash flows from a production facility. An intangible asset is also a claim to future benefits, but without a physical or financial image. A patent, a brand or a unique organizational structure that generates cost savings is an intangible asset. When the claim is legally secured, such as in the case of patents, trademarks or copyrights; the asset is referred to as intellectual property (Lev, 2001). Intangible assets can also be seen as information-based resources, which is for instance ‘customer trust’, brand image or information based capabilities (Amit and Schoemaker, 1993). According to Itami (1987), “invisible assets are the most important resources for long-term success”.

3.1.2 Different Categories of Intangible Assets

There are three major elements of intangibles: innovation, organizational practices and human resources (Bobrow, Cheslow, Whalen, 2000). Brands are often created by a combination of innovation and organizational structure. For example, Coke's highly valuable brand is the result of a secret formula and special marketing. On the other hand, human resource is created by unique personnel and compensation policies. According to Stahl (2002), the intangibles can also be grouped as follows:

- Technically Focused Intangibles: Technically focused intangibles can be defined as patents, product specifications, formulas and blending instructions, process technology, quality control systems and so on...
- Marketing Focused Intangibles: This group includes trademarks, copyrights, logos, brand names and marketing strategies.
- Skill Focused and Knowledge Focused Intangibles: These are training programs, customized proprietary management information systems and operational manuals.

3.1.3 The Cultural Element of Intangibles

The culture of an organization is important as it shows, for example, how the atmosphere of an organization is and the way employees work with each other. Each organization has a unique culture such as traditions, customs and ethics. According to Hagberg and Heiftiz (Corporate Culture webpage, 2002), understanding and to be able to assess an organization's culture can make the difference between success and failure of today's organization. Very often, culture comprises the deeply rooted but often unconscious norms, which are shared by the members of the organization.

A broader perspective was introduced by Stahl (April, 2002, Information week, Intangibles lead to real success), who states that cultural elements of a business have become increasingly important towards the success of the company. There

are many ways in which cultural elements are defined. For instance, it can be a dress code or flexible work hours. Culture could also be referred to how aggressive or risk-averse a company is, whether it's opportunity-seeking or slow to change, whether it places an emphasis on ethics or is known for questionable behaviour, whether it gives rewards for teamwork and creativity or whether it operates under strict hierarchical structures. The culture is regarded as the company's intangible asset and business driver (Stahl, 2002). This perspective of the cultural aspect is also supported by Sundeline (Telelogic, 2002), who refers to culture as an intangible asset and the role of it when Telelogic was acquiring new companies.

Further views are referred to a study by Erik Brynjolfsson of MIT's Sloan School of Management and Lorin Hitt of the University of Pennsylvania's Wharton School (Stahl, 2002 Information week), stating that intangible assets, when combined with capital investment in IT may lead to significant increases in productivity and market value. Brynjolfsson puts value on intangibles, which are for example open communication, employee empowerment, performance-linked incentives, training and other investments in human capital.

3.1.4 Theory on Identifying Value Creating Intangibles

“Forecasting and Valuation Analysis, Knowing the Business” discusses intangible factors concerning the firm's knowledge base. Accordingly, they are categorized in seven points (Penman, 1998, p.486):

- Direction and pace of the technological change and the firm's grasp of it
- Research and development program
- Tie-in to information networks
- Managerial talent
- Ability to innovate in product development
- Ability to innovate in the production technology
- Economies from learning

3.1.5 Current Problems Facing Intangible Assets

Stickney and Brown argue that (Stickney and Brown, 2001, p.20), “The most troublesome asset recognition questions revolve around, the rights that satisfy the criteria of an asset”. They further argue that companies generally recognize intangible assets when these are acquired from the external market. However, they do not recognize the intangible assets, which are developed internally within a company (Stickney and Brown, 2001 p.20).

According to the authors (Stickney and Brown, 2001 p.327), intangibles are often viewed as the essential factors, which contribute towards a firm’s success. Therefore problems arise, when models for valuing these intangibles are developed. Swieringa states that “The current financial accounting model has been shaped by the existing corporate arrangements for large, complex, and more or less permanent business enterprises that invest heavily in tangible assets. Such a model will be challenged by more flexible and fluid organizations, increased investments in intangibles or ‘soft’ assets...” (FASB, Stickney and Brown, p.326)

3.1.5.1 Intangible Intensive Companies

Sarath and Sougiannis (2000) conducted a study into more than 1,500 R&D intensive companies (Lev, 2001, p.97). Their findings are such that companies with high growth rate of R&D expenditures showed low growth rate of earnings, typical for intangible intensive enterprises as they are undervalued by investors. However, when R&D investments finally pay off, investors tend to correct their under valuation. Basically, their findings are related to the lack of information, which leads to high cost of capital. Furthermore, the authors point out that this could lead to harmful social consequences. For instance, companies, which invest consistently in intangibles such as knowledge and technology and yet do not perform so well, usually tend to have inflation related high cost of capital and in turn hinder investments and growth.

3.1.5.2 Focusing only on R&D

Findings of Aboody and Lev (2000) show that in the research of intangibles focus is given to R&D. This is due to the fact that R&D is the only significant intangible investment, which is disclosed by public companies. Furthermore, they state that intangibles create significant information asymmetries. “The private and social harms of such information deficiencies are obvious: insider gains come at the expense of outside investors” (Lev, 2000, p.99).

3.1.5.3 Volatility of Shares

Primarily, investments were made into tangibles such as buildings and machines. Therefore the value of such a company was at least in some way related to the value of the company’s physical capital. However, today, companies tend to increasingly invest in intangibles. The intangibles are the company’s most important assets, which makes it extremely hard to figure out the true value of the company. That, again, may partly explain the volatility of the stock market (Krugmann, N.Y. Times Oct, 22nd 2000 p.15, Lev p.131).

3.2 GOODWILL

In the eighties, goodwill was defined as the difference between the purchase price and the book value of an acquired company's assets (Davis, 1992). But according to Johnson and Tearney (1993), definitions of goodwill have evolved since then as follows:

- The Residuum Approach: In this approach, goodwill is defined as the difference between the purchase price and the fair market value of an acquired company’s assets. It is the leftover amount that cannot be identified as any tangible or intangible asset.
- The Excess Profits Approach: Under this definition, the present value of the projected future earnings is determined and recorded as goodwill. This concept is very difficult to measure since future earnings have no certainty.

Goodwill can arise in two ways. It can be internally generated or it can be acquired as part of the acquisition of another company. Both types of goodwill have been recorded in the past. However, only acquired goodwill is currently allowed to be recorded.

Companies carry goodwill on their balance sheet as if it were an asset as solid as a piece of machinery. The value of machinery rarely dissolves quickly, but the value of goodwill can evaporate in a flash if a company determines that it paid too much for intangible assets. As it is easy to imagine, companies typically do not want to admit they overpaid. But once they do, they must write down the vanished value so that the ‘intangibles’ line on their balance sheet reflects the fair market value. If this write-down leaves the company at a lower level than the liabilities, the company is left with a negative net worth, which often results in a dramatically lower stock price.

3.3 FASB AND IASB ON INTANGIBLES AND GOODWILL

Intangible asset, as defined according to IASB (IAS 38) can be understood as:

a non-monetary asset that does not have any physical substance and which is held for use in terms of producing or the supply of goods and services.

This can, for instance, include for rental or administrative purposes, which are identifiable and which are controlled by an organization as a result of previous actions from which future economic benefits are expected to come to an organization. Furthermore, the definition of intangible assets will also require that those assets are identifiable, which can then be distinguished from goodwill (Lev, 2001 p.151 IASB).

There are three critical attributes of an intangible asset, which can be summarized as ability to be identified, control and future economic benefits (IAS Plus webpage, 2002).

Goodwill, on the other hand, means that it should represent future economic benefits, which arise from synergy between identifiable assets or from intangible assets, however not meeting the criteria to be recognized as an intangible asset (Lev, 2001 p.151 IASB).

According to the US GAAP, goodwill is defined as the excess of the cost of an acquisition over the sum of identifiable net assets (Lev, 2001).

Goodwill also indicates that a company has the capacity and ability to earn an excess amount of money. However, if fair value of goodwill is less than the amount it is carrying, then the goodwill will be impaired, whereby a loss would be recognised (Moehrle, Reynolds-Moehrle, 2001).

3.4 THE FOUR RESOURCES CATEGORY OF A FIRM

The basic understanding of this theory is that a firm has attributes, which are considered as resources. These resources are all assets, capabilities, competencies, organizational processes, the firm's attribute, knowledge and information. There are several authors such as Hitt and Ireland (1986), who have compiled a list of such resources.

The resource-based view of the firm is a perspective, which goes back to the work of Selznick in 1957 and was hidden for nearly three decades by the so-called positioning view of the firm. The resource-based view of the firm was then developed by Penrose (1959). More contribution towards the resource-based view of the firm occurred during the 80's and 90's by Wemerfelt in 1984, Prahalad and Hamel in 1990, Barney in 1991, Conner in 1991, Lado et al in 1992, Mahoney and Pandian in 1992, Amit and Shoemaker in 1993, Peteraf in 1993, Prahalad in 1993, Lado and Wilson in 1994 and finally by McGrath et al. in 1995 (Schiller, 2002).

We will be using Barney's framework (1997, p.143) as a framework to analyze the three IT companies when identifying the value creating intangibles. He states that, in general, the resources of a firm can be divided into four categories:

- Financial capital: This involves all the different money resources that a firm can use in order to apply strategies. These can be in forms of capital from entrepreneurs, shareholders, bond holders, banks and retained earnings (Barney, 1997 p.143).
- Physical capital: Physical capital is the tangible assets used in a firm, such as plant, equipment, raw materials and geographic location (Williamson, 1975). To further define physical capital, it is for instance a firm's computer hard and software technology (Kirkpatrick, 1992, Barney 1997, p.143).
- Human capital: Human capital can be understood as training, experience, intelligence, judgement and other abilities of individual managers and workers. Their relationship and contributions can also be included (Becker, 1964, Barney 1997).
- Organizational capital: This category can be regarded as an addition of the previous category. This includes a firm's formal reporting structure, its formal and informal planning, controlling and co-ordinating systems. However, further attributes include the organization's culture and reputation, as well as informal relations among groups within a firm and between a firm and its environment.

“Organizational capital is human capital in which the attribute is embodied in either the organizational relationship, particular organization members the organization's repositories of information or some combination of the above in order to improve the functioning of the organization” (Tomer, 1987 p. 24).

These categories will differ from organization to organization as well as their contribution to the organization's overall performance. For example, the human capital of a high-tech company may be the main value creating factor; while in a car manufacturing company, physical assets such as plants and equipment play a more contributing factor. Further examples of resources that are categorized as the firm's intangible assets are patents, trademarks, copyrights, trade secrets, company reputation and so on (Barney, 1997).

3.5 INTELLECTUAL CAPITAL

Intellectual property is a term that covers patents, trademarks, copyrights, trade secrets, rights of publicity and moral rights. Intellectual property plays an ever-increasing role in the commercial world. There are two main branches of intellectual property (Davis and Miller, 2000):

- Industrial Property, which includes patents, trademarks, industrial designs, and trade secrets; and
- Copyright, which includes literary, musical, artistic, photographic, and audiovisual works.

There are several ways, in which a company assigns to intellectual capital, for example protecting their products and services from the company's innovation, protecting their freedom of designing, creating standards in new markets and creating barriers for new competition to enter the market (Lev, 2001 p.157).

3.5.1 Patents

A patent provides the patent holder, or patentee, the right to exclude others from making, using, selling or importing his invention for 20 years from the date the inventor files his application. The right to exclude others gives the inventor the first-to-market advantage in developing his product and it allows him to prevent competition in the early stages of his commercialisation effort.

Patentable material includes machines, processes, articles of manufacture and improvements on any of these items. Aside from these utility patents, two other categories of patents are design patents and plant patents (Davis and Miller, 2000).

3.5.2 Trademarks

A trademark is a crucial element of branding a product, and it can be a word, name, or symbol that is used to distinguish one company's products from

another's. Trademark rights cover only the use of the mark in commerce as connected to the product, not the mark itself or the product the mark represents. Unlike patent and copyright protection, trademark rights can potentially be of unlimited duration, lasting as long as the mark is in use by its owner (Davis and Miller, 2000).

3.5.3 Copyrights

The 1976 Copyright Act permits the owner of a copyright to exclude others from reproducing, displaying, performing, or distributing ideas expressed in a fixed medium such as text, film, video or sound recording, computer disk, or 3-dimensional form. They protect only the form in which an idea is fixed, not the substance of an idea, which lies in the territory of patent protection. The copyright is effective as soon as the work, published or unpublished, is created in fixed form (Davis and Miller, 2000).

3.5.4 Trade Secrets

A trade secret is any information, design, device, process, composition, technique, or formula that is not publicly known, and that provides those who know it with a competitive business advantage. Protection is lost if someone else discovers the information either independently or by analyzing or dissecting a product (reverse engineering). Since patent applications are kept confidential until and unless they are approved, an invention can remain a trade secret if the patent application is rejected. Types of trade secrets include chemical formulas or recipes and manufacturing processes or techniques (Davis and Miller, 2000).

3.6 ORGANIZATIONAL CAPITAL

Unlike physical capital, the value of the organizational capital does not appear on the balance sheet of a firm and when firms undertake substantial organizational change or re-engineering; this is typically treated as

consumption rather than an increase in the assets of a firm.

Organizational capital is divided into three broad components; training, employee voice and work design (Bartel, 1989).

- Training: Although training is usually thought of in the context of human capital, employer provided training is an important component of workplace organization and organizational capital. At the same time, organizational capital may interact with human capital; the ability of a firm to undertake organizational change may be a function of the human capital.
- Employee voice: Organizational structures that give workers, especially non managerial workers, input into the decision-making associated with the design of the production process and greater judgment in the structure of their work produce employee voice.

As employee voice increases, firms are better able to tap into the knowledge of their non-managerial workers. There is a large continuum of practices associated with employee voice. It ranges from the employee suggestion box in the lunch room, to employees being consulted individually about their views, to individual job enrichment schemes, to employees being consulted in groups, and finally, to self managed teams where production employees work in a semi-autonomous setting (Black and Lynch, 1997).

- Work design: Examples of practices include increasing the number of technical workers, the number of workers per supervisor, the number of levels of management within the firm, the existence and diffusion of job rotation, job share arrangements and methods by which firms monitor their practices.

As new technologies reduce the cost of lateral communication, firms use these technologies to facilitate greater communication between and across workers. Monitoring technologies can also be used to reduce the number of supervisors required in the production process (Delany and

Huselid, 1996). So there are possible complementarities between this and other dimensions of organizational capital, as well as with investments in physical capital.

3.7 HUMAN CAPITAL

Human capital is a term most closely associated with University of Chicago professor Gary Becker, the 1992 Nobel Laureate in economics. In a 1989 lecture, here's how Becker described human capital (Becker, 1993):

"Schooling, a computer training course, expenditures on medical care and lectures on the virtues of punctuality and honesty are capital too, in the sense that they improve health, raise earnings or add to a person's appreciation of literature over much of his or her lifetime. However, these investments produce human capital; because you cannot separate a person from his or her knowledge skills, health or values the way it is possible to move financial and physical assets from their owners."

In the 21st century, human capital is becoming more important because economies, companies and jobs are increasingly based on knowledge activities rather than physical labour and raw materials. Knowledge and skills that once lasted a lifetime now need to be updated every three to four years.

Of course, formal education is not the only way to invest in human capital. Workers also learn and are trained outside of schools, especially in the working place. Even college graduates are not fully prepared for the labour market when they leave school, and are fitted into their jobs through formal and informal training programs.

New technological advances clearly are of little value to countries that have very few skilled workers who know how to use them. Economic growth closely depends on the synergies between new knowledge and human capital, which is why large increases in education and training have accompanied major advances in technological knowledge in all countries that have achieved significant economic growth (Schultz, 1981).

The outstanding economic records of Japan, Taiwan, and other Asian economies in recent decades dramatically illustrate the importance of human capital to growth. Lacking natural resources, these so-called Asian tigers grew rapidly by relying on a well-trained, educated and hardworking labour force that made excellent use of modern technologies (Schultz, 1981).

3.8 SUMMARY

In this chapter, we discussed various ways of what is meant by intangibles and which problems are currently facing intangible assets. We then began with the definition of intangible assets and their different categories, followed by the definition of goodwill. Then, we introduced the definitions given to these two subjects by the FASB and the IASB. Furthermore, we introduced the four resources categories of a firm from Barney (1997) and referred to literature written about these categories in order to give a deeper understanding of them. For instance, we discussed different theories from Tomer (1987), Davis and Miller (2000) and Lev (2001).

4 CHAPTER FOUR - THE IT CRISIS

The purpose of this chapter is to define a crisis from a theoretical framework and to illustrate the development that happened in the IT industry during the IT boom and bust period. The framework from Kindleberger (1978) will be used to describe a financial crisis. It will cover concepts such as definition, process, and framework of a typical crisis.

4.1 DEFINITION OF FINANCIAL CRISIS

According to Kindleberger (1978), a financial crisis is normally associated with the peaks of a business cycle (p.3). A financial crisis is concluded by a period of expansion, which then leads to downturn. New opportunities for seizing profit are overdone in so many ways, which lead to a mania, basically a boom. And once the excessive characteristic of that up-swing is realized, the financial system experiences a distress. During that course, a rush to reverse the whole expansion process occurs, which abruptly leads to panic.

4.1.1 Process of a Crisis

Usually, the process is that during the mania (boom period), people of wealth or credit swap money or borrow to buy real or illiquid financial assets (Kindleberger, 1978). However, during the bust period, the reverse order or movement takes place from financial asset to money or the repayment of debt. This ultimately leads to a crash of commodity prices, housing prices, building, lands, bonds and stock prices. Basically, anything that has led to the mania will trigger off the bust. Further, Kindleberger argues that from a monetarist perspective, both a mania and a panic could have been avoided if the supply of money were stabilized at some fixed quantity (Kindleberger, 1978 p.6).

4.1.2 Framework of a Typical Crisis

Kindleberger argues (1978, p.14) that each crisis is unique. Furthermore, the author explains that a business cycle involves a full revolution of such an economic wheel, while boom and bust only deals with a portion of the cycle that covers the financial upswing and the initial downturn. Kindleberger (1978) uses a model of a monetary theorist, Minsky, to interpret such a financial crisis.

The model assumes that the urge to speculate is present, which is then transmitted into successful demands for goods or financial assets (Kindleberger, 1978 p.16). After a period of time, the increased demands push against the capacity to produce goods or to supply the existing assets. Hence follows an increase in prices, which in turn gives rise to new profit opportunity, which still further attract firms and investors. The cycle follows that positive feedback is going to be developed as the new investments lead to an increase in income. That further stimulates investments, hence further income increases. This term at this point in time is classified as ‘euphoria’ by Minsky.

4.1.2.1 Euphoria

During the stage of euphoria, further speculation for price increase is added to investment for further producing and selling. If this whole process is to be built up further, it will ultimately lead to a result of overtrading (Adam Smith, Kindleberger, 1978), which is not avoidable. The concept of overtrading may involve pure speculation of a price increase, an overestimation of potential return or excessive gearing (Joplin, note 3, Kindleberger, 1977). The model further explains that pure speculation involves buying for resale and that overestimating profits stems from euphoria, which affects firms in return. As firms or investors see others making profits, they will have the tendency to follow after some time. However, when the number of those firms and investors grows larger and larger, bringing in other segments of the population, that are usually not involved in such a venture, speculation for profits will lead away from the normal, rational behaviour to what is known to us as manias or bubbles.

4.1.2.2 Overtrading

During a later stage, speculation has a tendency to disconnect itself from really valuable objects and then turns to delusive ones. Consequently, a larger group of people seek to become rich without a real understanding of what the process is actually involved with. One more interesting fact, which needs to be paid attention to, is that speculation tends to be directly linked between markets and country. By that, Kindleberger (1978, p.18) means that this kind of euphoria or overtrading in one country can be fed by another foreign country.

4.1.2.3 Selling

If the speculative boom continues, interest rates, velocity of circulation and prices will all continue to increase. During this stage, there might be some insiders, who decide to take all their profits and sell their assets, such as shares. At this point in time, the top of the market hesitates to do so as new speculators are balanced by insiders, who are selling of their shares. What happens next is that prices begin to stabilize. When that happens, usually financial distress comes into play. That means a large amount of speculators may develop a tendency to make their assets liquid, which consequently leads to devastating effects on goods and securities. For example, some speculators may not be able to pay off their borrowed debt (Kindleberger, 1978 p.19). As the financial distress continues, speculators realize that the market cannot move higher and therefore, liquidate all assets. This will result in panic.

4.1.2.4 Panic

Panic is equivalent to the process of speculation with a reverse effect. Usually, at that stage, confidence slowly begins to restore and the rest is called history. Panic will continue until some point in time, when one of the following may happen:

- Prices of i.e. shares fall so low that investors are tempted to buy back some of the financial assets; or
- The trade is cut off as a limit for price decline is set; or

- The lender of the last resort convinces the market that money is available to meet cash demands.

4.2 THE IT INDUSTRY DURING THE IT BOOM & BUST

The real economic impact of new technology is not seen until after the bust. Growth is built on top of the technologies and companies that survive this cycle. In fact, this is the function of the boom-bust cycle. The boom feeds innovation and competition as differing versions of the new technology compete in market and it accelerates the maturation of new technology through this process of hyper-competition. On the other hand, the lack of capital during the bust forces a switch from technological innovation to economic innovation (Foot and Staffman, 1999).

The boom-to-bust cycle has been repeated many times over the past two hundred years. The economic promise of a new technology fuels this cycle. The previous boom-bust happened from 1980 to 1984 with the introduction of personal computers. Previous boom-bust cycles, on the scale of the Internet cycle, have happened with the automobile, railroads and canals (Philip, 2002).

The IT boom and bust of 1996 to 2002 was the most important business phenomenon of the past several decades. Among others, the overestimation of the speed at which the marketplace would adopt ‘dot com’ innovations was the most significant miscalculation. That resulted in over-investment, which led to the inevitable bubble and bust.

According to Drucker (1993), “It will always take time for people to integrate innovations into the way they do things”. History tells us repeatedly that innovations almost never replace existing products. Yet, many carried on modelling businesses in which online retailing replaced a significant percentage of existing retailing. According to Drucker, all that had to be done was “to look at the history of ‘catalogue marketing’ to predict that e-tailing might take its way into some minority of purchases, eventually reaching its natural point”. So, we can say that even a minor recognition of historic examples could have a positive effect on these previous years. But in fact, as it is generally, real life

showed the contrary. Many of the ‘dot coms’ came to market with high-cost products well before the infrastructure was ready to receive them.

A surprising number of entrepreneurs, presumably in the search for the big play, decided to use the Internet to reach the widest consumer markets imaginable. So, they bypassed the many rich demographic borders that the Internet enabled them to supply for a tiny proportion of the cost of the big play (Amor, 2000). So, many failed Internet start-ups began with ideas that involved little more than digging an existing business model into a web site or copying another company that did it. Much e-tailing simply exported catalogues to the web. (For the historical development of the IT product see Appendix IV).

4.2.1 Development of the IT Industry

There are a number of trends that has dominated the IT industry in the recent past. One of many is the rise of market-to-book value. According to Hall (1999), the market-to-book value is frequently raised to motivate the focus on intangibles.

Another trend dominating the IT industry is the standard interfaces. Customer requirement and the complexity of the IT products led to the standardization of the various components of information systems. The benefits of standard interfaces are that they allow the parallel development of components on respective side of the interface (a manufacturer of printer can develop new systems regardless of the development of computers, as long as the standard interface from printers to computers ‘Postscript’ remains fixed), they give access to a larger market (using the same standard interface) and they enable customers to modularize their IS/IT systems combining components from many different vendors (Bäcklund, Uthorn and Westher, 1995).

The standard interfaces have had a rapid and profound impact on the IT industry in itself. According to Moschella (1993), the most important impact is the disintegration:

Before disintegration, the industry was vertically integrated; companies made electronic components, produced printers, disk drives and developed systems software themselves. In today's market increasing costs and rapid changes in products and technology are against the vertical integration. So a disintegrated industry has emerged. Moschella (1993) characterised this new type of structure by two types of companies, those focusing on building the best hardware/software products and those focusing on delivering them to customers.

After the change of the vertical integration, IT companies started to specialize in one phase of the value chain (fragmentation). Today, the successful companies are smaller and highly focused in their respective fields. The disintegration and the fragmentation led to the growth of the overall number of the competitors in the industry.

In parallel with all the changes, the importance of service grew rapidly. As a result of this, many of the traditional computer vendors split up into individual business units for products and services respectively. At the same time, new service companies emerged.

In the IT market, customer need for integration is immediate. The factors feeding this need are fast technological development, the acceptance of standard interfaces and increasing functionality in available software. So the system integrator part of the industry became one of the biggest and fastest growing parts of the industry. And as a result, a new service called facility management has emerged. Exporting the difficulties to a facility manager became an attractive solution for managing the costs of IT, involving a long term contract. A facility manager simply takes over the management of central data processing operations, administration of networks and supplies for system engineering support to personnel in the company (Randeem, Brown and Lapides, 1995).

4.3 SUMMARY

In this chapter, we introduced the definition and phases of a financial crisis referring to Kindlberger (1978). Then, we illustrated the developments that happened in the IT industry before and during the boom & bust period.

5 CHAPTER FIVE - EMPIRICAL STUDY

Chapter five represents our empirical study chapter. Barney's framework (1997) of the four resources category of a firm will be used to analyze the three IT companies. We will be presenting the three Swedish IT companies: IFS, Telelogic and Micronic from the Attract 40 O list. The chapter will give a brief description of the companies' history, mission, vision and strategies. A summary overview of the companies is presented below:

IFS	Micronic	Telelogic
Component business applications based on advanced component technology.	High-tech company in development, manufacturing and marketing of laser pattern generators.	Develops solutions to organizations, that develop large and complex systems

Table 1 Summary overview of the companies analyzed

5.1 IFS

IFS AB main business line is to develop and to supply component based business applications. Furthermore, they aim to offer web-based business applications such as CRM and supply chain management components, Internet storefronts, and e-market and e-procurement solutions with their applications.

5.1.1 History

IFS AB was established in the year of 1983 and stands for Industrial & Financial Systems. In 1997, IFS was the first in launching component-based business applications and to advocate step by step implementations (p.8,

President). IFS AB is considered to be one of the ten largest companies in this industry sector and is currently operating in 43 countries. In 1997, the company had on average 852 employees, whereas in 2000, the number of employees had grown to 3,478.

5.1.2 Mission, Vision and Strategy

IFS AB provides IT solutions, which covers for instance business applications and e-business products, which are based on advanced component technology. Furthermore, their business concept is also to offer organizations value-added products and services, in order for them to implement the IFS applications for the organization's value chain.

The goal of IFS is to become one of the top five global business application suppliers, further with a number one position in certain targeted segments. Furthermore, they would like to provide organizations with solutions, which are combined with software services and resources and with valuable employees to assist.

Their main business strategy is to invest in growth and product development and would like to remain as a technological leader in component based system in the global market. They will focus on market segments, where they can continue to build industry competence and supply solutions. Furthermore, IFS AB has developed global partnerships, which enable them to expand but taking less risk and lower capital requirements. "...the current essential linkages between firms and their suppliers and customers are mostly reliant upon intangibles...this highly valuable intangible, often termed organizational capital...is among the most valuable of corporate assets..." (Lev, 2001, p.13) They develop competence through increasing the mobility of its employees and through resource development programmes.

5.1.3 Market Segments

IFS AB operates in 43 countries through joint and wholly owned subsidiaries as well as in conjunction with alliances and partners. In terms of competition, SAP, Baan and Intentia represented the main competitors to IFS in 1997.

IFS's products vary from Internet-based components to solutions for financial, human resource management, manufacturing and maintenance, engineering and design, customer relationship management to supply chain management (p.16). The Company also offers value-added services, such as modelling a customer's business process etc...

5.1.4 Physical capital

Looking into IFS's physical capital, the company owns land, buildings, machinery and equipment. IFS has its headquarters based in Sweden, Stockholm. Furthermore, the company has 79 offices.

5.1.5 Financial capital

In 1997, the group made a loss, which is partly due to the rapid international expansion and additional expenditures. They made a loss of 37.4 MSEK. Furthermore, they had MSEK 31 liquid funds and in addition MSEK 19 unutilised credit facilities. In 1998, the company made a profit of MSEK 5.8 and spent MSEK 190 on research and development costs. IFS have issued new shares, which amounted to MSEK 522 (1998, p.31). The company centralized their financial management in 1999, which means that all finances are managed by the parent company in order to minimize the exposure to financial risk. IFS made a loss of MSEK-159.1 and also implemented a rights issue, which yielded to MSEK 366 after costs. Further losses were made in 2000, amounting to MSEK 246.3, where a new rights issue was made in order to finance acquisitions. For that year, further new rights issues were made and convertible loan debentures were also offered to employees.

To sum up, the highlight supports the fact that during the interview with Mannie Svensson, he stated that in during the boom time, more focus was given to expansion while by the end of 2000; the bottom line has become a more important issue.

5.1.6 Organizational Capital

When we examine organizational capital, it is found that the company has formed operations in Greece, Saudi Arabia and Turkey. They received important contracts and in the annual report it states that that they have formed long-term relations with their customers and business partners, which have turned out to be profitable. In terms of the organizational structure, IFS' employees work with a high degree of autonomy in small teams. This is regarded to be suitable since this style of work suited the modular build-up of their products. Their working concept is freedom of action combined with high responsibility in their working area. These alliances are regarded as strategic alliances (2000, p.12). They are formed in a variety within important industry segments to IFS. Their strategy is also to further expand the collaboration and forming partnerships with the other companies.

5.1.7 Human capital

Human capital is developed by the company's highly technical level, which attracts skilled employees. The company states that "everybody wants to be in a winning team" (1997, p.23). In the same year, the company developed introductory programs for new employees. These introductory and training programs were then developed into a personnel program, which then allowed the new employee to specialize in an area.

5.2 MICRONIC LASER SYSTEMS AB

Micronic Laser Systems is a high-tech company active in the development, manufacturing and marketing of laser pattern generators for the production of photo masks used in displays and semiconductors.

5.2.1 History

In 1970's, Dr. Gerhard Westerberg began researching into micro lithography at the Royal Institute of Technology in Stockholm (KTH). In 1984, he set up the Company with seven employees. Following his death, the Company was taken over by the personnel and Dr. Nils Björk in 1989 and in 1990, the first laser writer was sold. In 1999, the Company entered the semiconductor market. On March 9, 2000, Micronic's shares were floated on the OM Stockholm Exchange's O list.

5.2.2 Mission, Objectives and Strategy

Micronic's mission is "to deliver resolution with productivity" and their objectives are "to maintain leadership in the display market and to become a leading supplier of laser pattern generators in the semiconductor market". Their primary strategy for accomplishing this is to gain and secure technological leadership. They also place importance on customer focus through a local market presence.

5.2.3 Market Segments

In 1998, since most of the LCD production within the display segment of the world was in Asia, many of Micronic's customers *suffered from the financial crisis*. As a result, they could not invest in new systems and expected orders were postponed until the end of 1998. The market was worth MUS\$ 40 in 2000, increasing over 100% comparing with 1999; but in 2001 the market was worth MUS\$ 25. Micronic expects growth that will reach MUS\$ 70 in 2004.

Micronic develops and manufactures laser writers used to make photo masks. Photo masks are used as originals in the manufacture of all electronic components. Micronic's markets are Japan, South-East Asia and USA. At the end of 2001, 70% of the sales were to Japan, 17% to South-East Asia and 13% to USA. Some of the Company's customers are Dai Nippon Printing, DuPont Photo masks, Hitachi, LG Mikron, Sony and Toshiba. The Company markets

its laser pattern generators in three main segments: displays, semiconductors and multipurpose systems.

- Displays: Micronic has 100% of the market for advanced displays, which was the main products' application until the Company entered the semiconductor market in 1999. Micronic supplies laser writers for the production of photo masks used in cathode ray tubes (CRT) for TV's and computer monitors and flat-screen liquid crystal displays (LCD) for laptops, video cameras and mobile phones.

CRT: The market for CRT's is divided into TV monitors and PC monitors. From these two, the PC monitor market is relatively mature and growth is limited. The market share of the Company is close to 100 % in the CRT market.

LCD: In LCD market, Micronic is the leader with 100 % share for large area photo masks. However, the Company shares the market in the small masks with Dai Nippon Screen, Pentax and Heidelberg Instruments Mikrotechnik GmbH.

- Semiconductors: These components constitute the essential parts in all modern electronic equipment, ranging from mobile phones to credit cards, cars and computers. The market is approximately ten times the size of the display market. It grew by 37% in 2000 with global sales of MUSD 232 and 80 billion microchips as production volume, which means 13 microchips for every person in the world.

Technological developments towards more complex semiconductor components with higher resolution double the pattern density every year without any reduction in productivity, which creates a frightening challenge for companies operating in this market. The market is divided into two different products: electron-beam and laser based systems, where electron-beam technology offers higher resolution and laser based systems offer higher productivity. The main player, Etec Systems Inc. from the US, which became a wholly owned subsidiary of Applied Materials Inc., offers products of both types. Other players include

Toshiba, Hitachi, Jeol and Leica, which only supply electron-beam pattern generators.

On the other hand, Micronic offers the resolution the customer requires with high productivity of the laser technology. Micronic entered the laser based systems market in 1999 with SLM technology, which offers a cost-effective manufacture of photo masks and was developed in co-operation with the German development institute, Fraunhofer IMS. In 2000, the Company received a number of orders of laser pattern generators and received a 10 % share of the market by the end of 2001.

- Multi Purpose: In this market, Micronic manufactures laser pattern generators for photo masks used in electronic packaging, passive panel displays and encoders of which electronic packaging experiences rapid growth. This creates customer demands with increasing resolution.

PDP (Plasma Display Panels): Although PDP's are a type of display, they belong to the multi purpose segment. In 1997, Micronic introduced the world's largest mask writer intended for plasma displays (PDP) used in large-screen TV's. However, the quality of large screen TV's needs to be improved and the price needs to be decreased in order to talk about an outstanding commercial breakthrough of the PDP technology.

5.2.4 Physical Capital

In 2001, Micronic comprised the parent company, Micronic Laser AB, which is based in Täby, outside Stockholm, Sweden, and the wholly owned subsidiaries, Micronic Japan K.K., Micronic Laser Systems Inc., USA, Micronic Taiwan, which is under formation and Micronic Treasury AB. Micronic Treasury AB, which has no employees, was set up in 1997 to enable the Company to introduce options programme. Micronic Laser Systems Inc. was established in 1999 to offer service and support as well as strengthen marketing. Micronic Japan KK provides maintenance and service for Micronic's customers in Japan.

5.2.5 Financial Capital

The shares of the Company were listed on the OM Stockholm Exchange's O list with effect from March 9, 2000. By the end of 2000, the share price was SEK 279, starting from SEK 105. This gave a market capitalisation of MSEK 5,329. According to several business magazines, including *Finanstidningen* and *Dagens Industri*, Micronic's IPO was one of the most successful in 2000. By the end of 2001 the share price went down to 191 and fell by 32%.

As of December 31, 2001, the share capital of Micronic amounted to SEK 19,202,583. The staff own 6 %, management and the Board own 2 % of the shares.

As the end of 2001, the total equity was 697 MSEK, showing an increase of 783% since 1997. The big increase comes from the listing of the shares in 2000, increasing 482% comparing with the previous year. During all these years the long term liabilities of the Company stood around 45-55 MSEK; which in 2001, increased to 423 MSEK due to the loan taken from ASML Holding NV, Netherlands. As part of the agreement made with ASML, Micronic issued a debenture of 320 MSEK to ASML. The loan is for three years and can be converted to 1 million Micronic shares until July 31, 2004. In that case, ASML will hold %4.9 of shares and voting rights. Micronic received payment from ASML on July 31, 2001.

5.2.6 Organizational Capital

Micronic markets and distributes its products either directly or via distributors and agents. Korea, Hong Kong, Taiwan, People's Republic of China and USA are served by local distributors or agents supported by sales and marketing personnel from Sweden. The company has its own service offices in Japan, Taiwan and USA. In Japan, which is the main market, the Company has one distributor: Hakuto, which is also a shareholder in Micronic.

5.2.7 Human Capital

Micronic's strategy is to recruit people with key competence from other countries, where expertise from the semiconductor industry can be found. These people spend time in Sweden periodically and pass on their knowledge to other employees. At the end of 2001, the Swedish operation had employees of 16 different nationalities. Employee turnover was 8% until 2001. Most of the original staff that were there in 1989 are still active in the Company.

5.3 TELELOGIC AB

Telelogic AB develops solutions to organisations that develop large and complex software systems with geographically spread development teams.

5.3.1 History

Telelogic's operations began in 1983. At that time the Company was just the R&D division of the Swedish Telecommunications Administration (Televerket) which then became a subsidiary. The merger with Telesoft in 1989 had unsuccessful results and in 1992 Telelogic became an independent company focused on SDL suite, a product developed by the Company since 1983. In 1995, Saab Combitech became the majority stockholder. In the following two years, Telelogic grew organically by over 200%. In May 1998, German distributor S&P Media was acquired and Saab Combitech sold its shares to a joint venture of investors.

On March 8, 1999 Telelogic was listed on the OM Stockholm exchange. In one year the share prices had risen from SEK 5 to SEK 45, resulting with a growth of 78%. The same year, Telelogic acquired its largest competitor, the French software company Verilog. In 2000, the Company acquired QSS, Continuus and ATA. These acquisitions made the Company expand to the automotive and aerospace/defence industries. In 2001, demand dropped and the Company implemented an action program to cut costs and reduce employees. Despite this, the Company grew by 70% the same year.

5.3.2 Mission and Strategy

Telelogic's mission is to help customers become leaders in product reliability and time-to-market by providing solutions for advanced systems and software development. Their strategy for accomplishing this is,

- to target the telecom, aerospace and automotive industries in order to make best use of resources and gain a significant competitive advantage;
- to focus on new customers by strengthening position beyond telecom, aerospace/defence and automotive industries;
- to take an active part in restructuring the industry by striving for partnerships and alliances with leading players;
- to focus on organisational efficiency in order to achieve both short and long term objectives of profitability and positive cash flow and
- To attract and develop individuals with exceptional attitude and skills.

5.3.3 Market Segments

Telelogic's product portfolio has three families of tools that complement one another. These tools are flexible so that they can easily be integrated with tools from other suppliers.

Telelogic DOORS is a requirement management tool, which is integrated to the other two tools and offers a number of interfaces so that users can select the model that best suits them. In the following years, DOORS is planned to be translated to Japanese. In 2000, the market share of Telelogic in requirement management was 31% (Source: Standish Group 1999). The main competitors in this market are Rational, Starbase and Integrated Chipware.

Telelogic Tau is a development environment for analysis, design, implementation and testing. Tau is unique in offering full visual modelling of

software. In 2000, the market share was 47% (Source VDC 2000). The main competitor is Rational.

Telelogic Synergy is the tool for change, configuration and version management. Synergy makes it possible to understand why a certain change was made, who did it, its consequences and if desired to rebuild the conditions as they were before the change was made. In this market, up to 2001 no exact measurement was made for Telelogic's market share. However, according to their financial reports in 2001, the market leaders are Rational and Merant.

Telelogic has also a separate business unit called Components, which delivers software in the form of finished building blocks. These are based on standards within the area of 3G.

Telelogic's markets are the Nordic Region, Europe, Asia and the US. At the end of 2001, 37% of the sales were to Europe, 33% to the US, 18% to the Nordic Region and 12% to Asia. Some of the Company's customers are Ericsson, Nokia, Telia, BAE Systems, Astrium, Philips, BMW, DaimlerChrysler, Robert Bosch, Siemens Automotive, Alcatel, Compaq, Canal+, Credit Lyonnais, Peugeot and Motorola. The Company's solutions can be found in the commercial sector and the communications, automotive and aerospace/defence segments.

- The Commercial Segment: For the customers in this segment, the most important feature of the systems is reliability and security. This segment is the new segment of the Company.
- The Communications Segment: This is the main and largest customer segment of Telelogic. There are many important players in the industry, which can be defined as government agencies, standardisation bodies, service suppliers such as Telia and Vodafone, system suppliers such as Ericsson and Motorola and subcontractors to the suppliers such as InterDigital. Telelogic works with all of the entities mentioned above. However, the focus is on suppliers, the segment in which most development is carried out. Currently, suppliers are merging to become large international companies. This trend has led Telelogic to sign a

number of strategic contracts with leading telecom suppliers.

- The Automotive Segment: The players in this segment can be defined as standardisation bodies such as OSEK, manufacturers and subcontractors such as Denso and Robert Bosch. Telelogic works with all the entities with focus on manufacturers and subcontractors. Like the communications industry, the automotive industry is also currently in a phase of consolidation with international mergers. Telelogic has primarily marketed to the German automotive industry. The goal is to expand marketing to US and Japan.
- The Aerospace and Defence Segment: These two industries are very similar and often recognized as being in the same market. Some important players are standardisation bodies, purchasers such as ministries of defence, system suppliers such as BAE and Boeing and subcontractors such as Ericsson Microwave. Telelogic focuses on suppliers and subcontractors. In recent years, the number of suppliers decreased because of the international mergers and the situation between suppliers and subcontractors became more complex. The industry needs the same tool in all links of the supply chain for reliable delivery and quality. Telelogic has developed a management tool called DOORS for this particular purpose. An important point is that the trend in the industry is towards using commercial standards instead of internally developed technology.

5.3.4 Physical Capital

In 2001, Telelogic comprised two headquarters and eleven subsidiaries. One of the headquarters is situated in Malmö, Sweden and the other is in Irvine, USA. All subsidiaries were acquired between 1998 and 2000, five of which are consultant companies in Europe, one of them is a distributor from Germany and the rest are providers of different tools such as requirement management and configuration management and SDL. The Company has also distributors and sales offices in the European, American and Asian-Pacific regions.

5.3.5 Financial Capital

The shares of the Company were listed on the OM Stockholm Exchange's O list with effect from March 8, 1999. The introductory price was SEK 5. As of December 31, 2001, capital stock amounted to SEK 1,894,066 distributed among shares at a nominal value of SEK 0.01.

During the period of August 21–September 11, 2001, the Company issued new equity, which gave stockholders two alternatives. The choices were either acquisition of a new share for each two shares held at a rate of SEK 3.70, or subscription to a convertible loan in which every 20 shares entitled the holder to a convertible loan of SEK 37. This convertible runs until December 31, 2005 with an annual interest rate of %3.30 and also at any time can be converted to stocks at a rate of 3,75 per share. This new issue was fully subscribed and brought in SEK 234 million after issue costs. On the other hand, in 2001, goodwill has been amortised with MSEK 1738 to MSEK 301.

In 1998, the long term liabilities of the Company were MSEK 29, which in 1999, rose to MSEK 179 with the acquisition of Verilog SA. In 2000, the amount was reduced to MSEK 71 and in 2001 it was 136 due to the liabilities coming from the acquisitions of Certeam AB, ATA Inc, and Verilog SA.

5.3.6 Organizational Capital

Telelogic's operations are divided into three groups: products & technology, market divisions and corporate functions. The market divisions work in six different regions: Nordic, Central, Southern, Western and Eastern Europe, the US and Asia. These divisions provide sales, marketing, consulting and training. There are also key account teams that work with only one customer worldwide. The corporate divisions are located mainly in Sweden and the US. They consist of Marketing, Sales, Finance and Administration and Business Development. These functions only have a few staff members working on a global basis. The majority of the staff is located close to customers in marketing divisions.

5.3.7 Human Capital

Telelogic's strategy in maintaining a high level of motivation among personnel and ensuring internal efficiency is continual personal development, teamwork, basing decisions on changes in the market and having a system-oriented thinking.

6 CHAPTER SIX - ANALYSIS

During our empirical research we found that there are two groups of intangibles, which we have grouped into reported and unreported intangibles. Reported intangibles are usually items that are listed on the balance sheet such as R&D, goodwill and IPR whereby unreported intangibles are for instance organizational capital, human capital and culture, which cannot be found on the balance sheet. The aim of this chapter is to identify the value creating intangible factors of the companies and to compare, whether they have changed during the IT crisis. The chapter is derived from two parts, sub problem I and sub problem II. Sub problem I will identify intangible factors contained in our empirical findings, whereby sub problem II will detect changes that have occurred during the boom and the bust period. Our analysis is based on the frameworks discussed in our theoretical chapter, such as Tomer (1987), Barney (1997) and Davis and Miller (2000).

6.1 DEFINITION OF INTANGIBLE ASSETS

We have conducted four interviews with IFS, Micronic and Telelogic. We interviewed Manni Svensson, Founder and Senior Vice President in Media and Investors Relations in IFS; Johan Nordqvist, director of Intellectual Property Rights in Micronic; Anna Ulinder, director of Investor Relations in Micronic and Catherina Sundeline, director of Information and Investor's Relations in Telelogic. Our analysis will be supported with the answers given by the interviewees. Firstly, the question was to define what intangible asset meant:

“If you look at intangibles, we are talking about the balance sheet items such as R&D and goodwill...,but if you meant non balance sheet items, you are talking about people and knowledge” (Manni Svensson, IFS, 2002)

On the other hand, Nordqvist's (2002) definition was intellectual property. Sundeline (2002) stated that intangibles were knowledge, intellectual property, code in software, culture and the spirit of the people. Ulinder (2002) stated that Micronic had reported R&D expenses as intangibles in previous years.

6.2 REPORTED AND UNREPORTED INTANGIBLE ASSETS

We would like to introduce the concepts of reported and unreported intangible assets. The reason, why we have grouped them that way is due to our findings from our empirical study. We found that intangibles are simply not only balance sheet items such as R&D and goodwill, but our research has shown that there is much more to intangibles such as people, knowledge and organizational capital. A summary of reported and unreported intangibles is presented below:

Reported Intangibles	Unreported Intangibles
R&D	Organizational Capital
Goodwill	Human Capital
IPR	Culture

Table 2 Reported and Unreported Intangible Assets

6.3 SUB-PROBLEM I: Value Creating Intangibles

The first section will address our first problem definition, where value creating intangibles are identified. In order for us to identify the value creating intangibles, we will be looking into Barney's framework of organizational capital and human capital. However, as we have identified it in our theory chapter, there are more other intangibles. Therefore we have formulated the problem as follows:

- Sub Problem I -

What are the value creating intangible factors of Swedish IT companies?

We will identify the value creating intangibles under two groups, which are the reported and *unreported* intangibles as mentioned above.

6.3.1 Reported Intangibles

First of all, we will be looking into the intangibles, which are grouped under the balance sheet items of the companies.

6.3.1.1 R&D

What significance do intangibles have in contributing towards the success of the company? “I would put them in five categories...R&D is one of them.” (Svensson, IFS, 2002)

- **IFS:** Manni Svensson believes that as for many other IT companies, the case is also for IFS that R&D is one of the most important value creating intangibles. The company has large amount of expenses in their product development area, which was used for their business applications. R&D costs are also considered to be the highest for IFS among the industry (1997, p.5), whereby the majority is assigned to personnel costs. The R&D department from IFS participated in the development of IFS and have now established a big source of information, which create value for IFS by providing sales support as well.
- **Micronic:** Micronic is more concentrated on R&D than IFS and Telelogic. However, the level of capitalization of the R&D in Micronic is rather low (Nordqvist, 2002). But anyway, R&D is one of the value creating intangibles in the Company.
- **Telelogic:** Telelogic began its operations as an R&D department of the Swedish Telecommunications Administration in 1983. Since then the Company has been active in R&D. The Company is; for example, already ready to launch development tools that are written in languages currently in the process of standardisation. However, R&D was not reported as an intangible until 2001.

6.3.1.2 Goodwill

“It is natural that you have to write goodwill down. It also proves that some goodwill items are worthless” (Svensson, IFS, 2002).

- **IFS:** It is found that IFS’s business strategy is to grow both organically and through acquisitions. This is regarded as more important than ever (Svensson, 2002). Due to their expansion into foreign markets, the company has acquired a lot of other companies and thereby they have generated a lot of goodwill. Goodwill is amortized over a period between 10 to 20 years, which depends on an individual assessment of the economic lifetime (IFS, 2000, p.44).
- **Micronic:** Micronic does not report any goodwill. They did not acquire their subsidiaries, but instead built them according to their own needs (Ulinder, 2002).
- **Telelogic:** Telelogic’s strategy has been to move to other markets, such as aero-defence and automotive, and widen the product portfolio through acquisitions. The acquisitions have generated goodwill and by the end of 2001, 21% of the total assets of the Company were represented as goodwill.

6.3.1.3 Intellectual Property Rights/ Intellectual Capital

“My definition of intangibles is IPR. When I say IPR, I mean patents, trademarks and designs. Our company deals with patents.” (Johan Nordqvist, Micronic, 2002)

- **IFS:** By analyzing IFS’s intellectual capital, it can be said that ‘product rights’ can qualify for the term of intellectual capital. Their product right such as IFS Foundation 1 is considered to be an important value creating intangible as it is recognized as a visionary and leading framework for the development of business applications, which ensures competitive advantage and ‘future proof technology’ (IFS, 2000, p.20).

- **Micronic:** According to Johan Nordqvist (2002), director of Investor Relations, Micronic sees IPR as an important source of intangibles. In order to protect innovations and to secure the long-term competitive advantage patents have strategic importance. IPR has been reported since 1999 at Micronic.
- **Telelogic:** For Telelogic's customers, international standardisation provides major benefits; since these standards protect them from investing in different products and versions for individual countries. To speed up the standardisation process, standards are more often developed in collaboration between industry and bodies. A few examples are Third Generation Partnership Project (3GPP), IEEE 1394 Trade Association and Open Systems and the Corresponding Interfaces for Automotive Electronics (OSEK/VDX). Telelogic participates in all of these organisations mentioned above and has chairmanship in OMG. This shows the influences the Company has in developing new standards.

6.3.2 Unreported Intangibles

What significance do intangibles have in contributing towards the success of the company? "Quiet a lot... As people and knowledge make up 95% of the value of the company..." (Catherina Sundeline, Telelogic, 2002)

This part of the thesis will try to fulfil the purpose of our writing as follows: So far, the thesis has looked into intangibles, which are grouped under the balance sheet of the company. A deeper look will now be given to the intangibles, which are 'non-balance sheet items'. The purpose of the thesis is to detect the other value creating intangibles, which can have a great deal of influence over the IT market, in fact over the IT crisis. The reason for that is that these non-balance sheet intangibles are not stated by IT companies, but to which a great amount of monetary value can possibly be attached.

6.3.2.1 Organizational Capital

Do partnership and alliances still go on in your company for the future?” Yes, it is more important than ever. Basically, more emphasis has been given over the last two years, which is a strategy...” (Svensson, IFS, 2002)

- **IFS:** One of the most significant values creating intangible factor, which is not stated in the company’s balance sheet is their organizational capital. Looking into the IFS’s annual report, there is a statement that says, “The collected competence of our personnel is our greatest asset.” Although it supposed to be IFS’s greatest asset, no monetary value has been attached to it. One can only find the number of employees.

IFS have formed many alliances and partnerships with other organizations to expand into different markets and to establish a powerful source of information sharing. Due to that, their own infrastructure has improved and many business advantages have taken place, such as additional capability to add new processes, to understand the interface with no training experience requirement and so on (IFS, 2000, p.19). It has become clear that the company has created a lot of linkages, which are profitable to them. These include customers, suppliers, employees and partnerships. Due to the company’s international position, IFS develops products, which are based on market information directly received from all over the world. These factors demonstrate that due to their efficient infrastructure, IFS can create a competitive advantage.

- **Micronic:** The primary strategy of Micronic in achieving objectives is customer focus through a local market presence. This is why the Company has established subsidiaries around the world. For example, Micronic Laser Systems Inc in USA, Micronic Japan KK in Japan and the newly established subsidiary in Taiwan. The Company has also local distributors, agents and service offices in Korea, Hong Kong, Taiwan, China and USA.

- **Telelogic:** Telelogic has a large product portfolio supported by a wide organizational structure. The Company can, sell/distribute its products and give consulting/training services to any company in any country situated in Europe. The Company also has distributors and sales offices in American and Asian-Pacific regions and five subsidiaries that work on creating new tools. Telelogic operates in industries that show huge variations from each other (e.g. commercial segment and aero-defence segment). Some customers have extensive, detailed processes while others work within a simpler, open framework. This is the reason why Telelogic has built an independent process that can answer any customer.

6.3.2.2 Human capital

“There is a big difference between, for example, top performing and average consultants in terms of their personality and how they run the business” (Svensson, IFS, 2002).

- **IFS:** IFS has developed human capital by putting employees in special training programs, by hiring highly technical people and letting their employees have freedom in action and responsibility. IFS’s human capital is their research and development staff, which the company refers to as their ‘skilled people’.
- **Micronic:** Micronic’s strategy to develop human capital is to recruit experts from other countries and make them spend time in Sweden periodically; so that they can pass on their knowledge to other employees. The Company also encourages individual initiative for new solutions by for example rewarding employees for patents obtained.
- **Telelogic:** Sundeline (2002) states that Telelogic generated human capital by its acquisitions. The criteria for an acquisition are technology, product and people for the Company. According to Catherina Sundeline, director of information and investor’s relations in the Company, “it is cheaper to acquire people than recruit them”: The Company’s total personnel were 1,262 in 2001. The same number was 150 in 1998.

6.3.2.3 Culture

What are the criteria when acquiring a company? “The criteria are...people, culture...” (Sundeline, Telelogic, 2002)

- **IFS:** The corporate culture of IFS and the way the organization works are broadly characterized by professionalism, simplicity and commitment (1999, p.11). During the interview with IFS’s Senior Vice president, the question was raised; to what extent consultants are vital to the company i.e. the way they work, which incorporate the above characteristics of professionalism etc. In accordance, it is said that the way the consultants work are an important factor. For instance, they have to act like businessmen and project managers have to take on responsibilities, which can be characterized as professionalism. This illustrates that the culture of IFS has exercised influence over how, for example consultants work. For instance, interpersonal skills are important to consultants, such as how they relate to their customers and how contacts and contracts are established in that way. All these are aspects, which could have led to customer loyalty and collaboration, which ultimately lead to creating value for the company.
- **Micronic:** What is behind Micronic’s success is the confidence customers have in the Company. One laser pattern generator costs approximately MSEK 100 and this investment is even greater for a customer. So a customer must believe that Micronic will be around in the future when the technology has been developed even further. This great confidence comes from the culture of the Company: Commitment, global presence and strong technological knowledge, which combines different areas of expertise such as optics, laser technology, data and image processing.
- **Telelogic:** According to Sundeline (2001), the culture of Telelogic is defined as for instance, the spirit of the people, who are working for Telelogic. The spirit of the people can be understood as i.e. the attitude of the employees, the value and the beliefs they hold.

6.4 SUB-PROBLEM II: Changes during Boom & Bust

In this section, we would like to know, whether the value creating intangibles have changed over the IT boom and bust period for the three companies. Therefore, we will follow the same approach as above in sub problem I and have grouped them under the balance sheet and non-balance sheet item. The question arises for us, what has happened during the boom time in compared to the bust time with these value creating intangibles.

- Sub Problem II -

Did these factors change during the IT boom & bust period?
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“During the boom era, some market segments showed very strong sales...in comparison, if you look at the bust period, it turns back to the opposite directions, there are for example losses in the dot.com customers, the availability of financing changes and the bottom-line is more crucial.”
(Svensson, IFS, 2002)

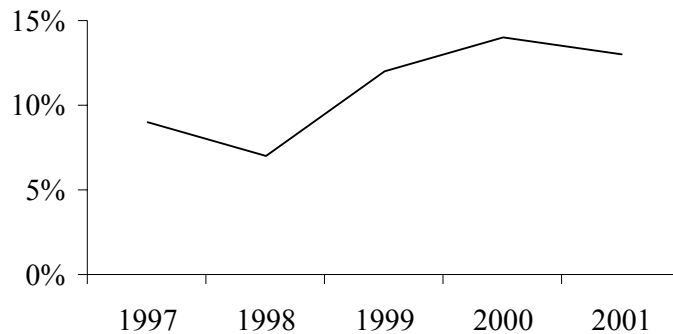
6.4.1 Reported Intangibles

6.4.1.1 R&D

“We invested more in R&D during the boom period...Emphasis is still given to R&D. However, one is also cautious in terms of expanding and ongoing developments...” (Svensson, IFS, 2002)

- **IFS:** R&D is surely one of the biggest value creating intangibles for IFS. In 1997, the company states that their R&D had the highest expenditure among the industry. However, these factors have slightly changed from the boom to bust period. More investments were made during the boom period in comparison to the bust period. During an interview with IFS, Mannie Svensson (2002) states that although focus is still given to R&D and product development, the company has shifted their attention to cash flow and net income during the IT crisis. Therefore it can be seen in the next page (The ratio of R&D to Net sales) that the percentage of R&D as

compared to net sales has have decreased during 1998 and 2001.

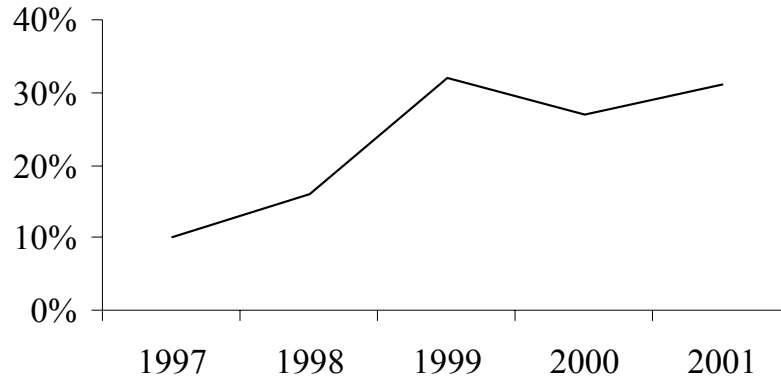


Graph 1 - R&D/Net Sales in IFS

- **Micronic:** Since 1997, Micronic has invested at least 20% of its total sales in research and development every year and about 50% of the staff have been engaged in this.

During the IT boom and bust period, the Company achieved a number of R&D innovations. For example, one of the successes of R&D in Micronic is the entry to the semi-conductor industry in 1999: The cooperation with Fraunhofer IMS allowed Micronic to develop a new technology called SLM. With this technology, the Company has now a competitive advantage in the industry (Nordqvist, J.). In only one year the Company achieved a %10 market share of the semi-conductor segment. According to Nordqvist better results will come with focus on marketing activities.

Other examples that show continuous R&D activity in the Company are the introduction of the world's largest mask writer in 1997 and the strategic cooperation made with ASML Holding in 2001 in the field of direct-write applications. Direct write applications are considered to have future potential in the market. Graph 2 shows the R&D expenditures to net sales in Micronic between 1997 and 2001.

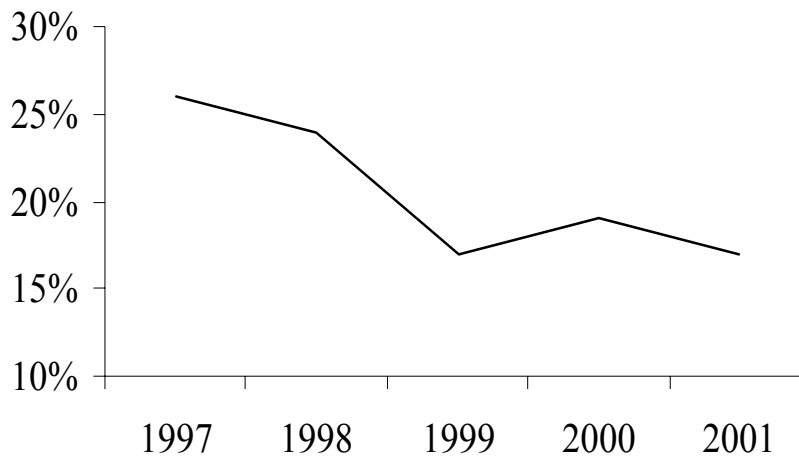


Graph 2 - R&D/Net Sales in Micronic

As we can see from the graph, R&D expenditures increased during the IT boom & bust period. However, Micronic has not reported any R&D as an intangible until 2001. By the end of 2001, capitalized expenditure for R&D was only 1% of net sales.

- **Telelogic:** Sundeline (2002) states that Telelogic has invested more in R&D during the boom period, but that it was due to acquisitions, and not because of the boom.

Furthermore, the standardisation body, Object Management Group (OMG), is currently working on developing a new version of UML (visual language), in which Telelogic is a leading player and is already ready to deliver development tools on this new version. On the other hand, together with Nokia, the Company is also developing a new generation of test tools. Below are the R&D expenses to net sales between 1997 and 2001. However, Telelogic reported capitalized R&D by 2001, which at that time represented 5% of net sales.



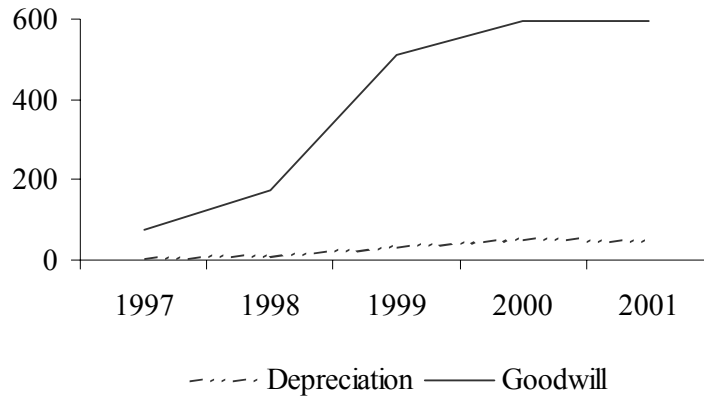
Graph 3 - R&D/Net Sales in Telelogic

6.4.1.2 Goodwill

“Goodwill is down to future expected cash flows and during the boom period, auditors believed that it would bring in positive future cash flows, however during the bust period, auditors had to write a lot down since it didn’t perform to expectations.” (Sundeline, Telelogic, 2002)

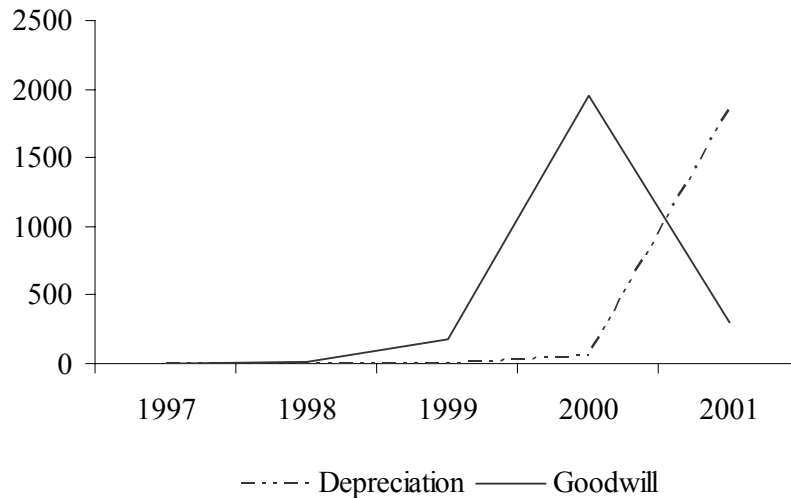
- **IFS:** Acquiring companies is part of IFS strategy to expand into foreign markets. Nowadays, goodwill is discussed among accountants, as to what extent it should be written down. The question has risen during the interview with IFS, to what extent goodwill has changed when it comes to write down from the boom to the bust period. The findings are that in IFS, more goodwill has been written down during the IT bust as it has proven to be worthless.

Chapter Six – Analysis



Graph 4 - Goodwill and Accumulated Depreciation in IFS (MSEK)

- **Telelogic:** On March 8, 1999 Telelogic was listed on the OM Stockholm exchange. In one year the share prices had risen from SEK 5 to SEK 45, resulting in a growth of 78%. This gave the possibility for the Company to acquire its largest competitor, the French software company Verilog. In 2000, the acquisitions continued and the Company expanded its operations to the automotive and aerospace/defence industries. Below is the goodwill amount to total assets in the Company between 1997 and 2001.



Graph 5 - Goodwill and Accumulated Depreciation in Telelogic (TSEK)

The graph shows that in 2001, with the effect of the bust, demand dropped and goodwill, which resulted from the expansion program, was

written down by MSEK 1.7. Since then, the Company implemented an action program to cut costs and reduce employees. According to Sundeline (2002), Telelogic has just written down a lot of goodwill and she thinks that Telelogic shouldn't need to write down so much next time.

6.4.1.3 Intellectual Property Rights/ Intellectual Capital

“...The only problem was that in 2000, these patents were overvalued.”
(Nordqvist, Micronic, 2002)

- **IFS:** In regards to IFS's technology development, IFS Foundation 1 has been recognized as IFS's visionary and leading framework in the development of business application since 1995. This can be grouped into IFS's intellectual capital (Lev, 2000). IFS Foundation 1 has made it possible for IFS to add new technology gradually as well as establishing features, which make their application more easily applicable. The company is in a well prepared position to incorporate new technologies into IFS Foundation 1, which has allowed their technology to be turned into a business value creating factor, as the company concludes that this is their future proof technology (2000, p. 20).
- **Micronic:** In 2001, the number of patents at Micronic was 39. The corresponding number was 10 in 1997. By the time of the interview done with Johan Nordqvist, director of IPR, at the end of October, 2002, the Company had 51 patents and by the next week the interview was made two more were going to be added. The concentration of efforts made in this area shows clearly that IPR is a value creating intangible asset in Micronic. The Company added IPR to its intangibles in 2001, which then represented 17% of total assets.
- **Telelogic:** The Company is not following the industry, but instead is changing it with its internal innovations and standardisation processes that it is also active in. After the bust, industries that Telelogic is operating in, such as the automotive and the aero-defence, started a phase of international mergers. This development led to the need of

standardised tools in all links of the supply chain in these industries. This makes the trend towards using commercial standards instead of internally developed technology. So, the standardisation activities leading to IPR became increasingly important as value creating intangibles for companies like Telelogic. The IPR has been around 1% of total assets during 1997-2001.

6.4.2 Unreported Intangibles

“... During the bust period, or crisis so to speak, everything is wiped out as many people have to be fired...” (Sundeline, Telelogic, 2002)

6.4.2.1 Organizational Capital

- **IFS:** For instance, IFS relies heavily on organizational capital. What really created value for the company is for instance the partnership and collaboration, which they have with other companies around the world. The company states that “Long-term relations with customers are profitable. In 1997, part of IFS’s strategy was to grow organically as well as through acquisition, for instance, IFS made acquisitions in Brazil, Denmark, France and Sweden, which in turn has contributed 17% of the group’s sales (1997, p.5). Furthermore, the company has partners operations in Greece, Saudi Arabia and Turkey, which have turned out to be profitable. They result in follow-up business and supplementary orders” (IFS, 1997, p.21). This is done by having independent regional offices, which in turn creates the condition for initiating and forming relations with customers and local business partners. The company has the advantage of an international organization as they are in a better position to develop their product based on market information, which is directly received from all part of the world (1997, p.21). In terms of the organizational structure, IFS’ employees work with a high degree of autonomy in small teams. This is regarded to be suitable since this style of work suited the modular build-up of their products. Their working concept is freedom of action combined with high responsibility in their working area. As for the year 1998, it can be said that due to growth and

that IFS has become better known, there was an increase interest among partners to cooperate with the company. This in turn assured high quality (1998, p.10). For 1999, IFS became more or less flat structured, which allowed for flexibility and short decision making process. Up to today, the company uses these links as part of a strategy to expand into foreign markets and to create value for the company. The organizational infrastructure can be value creating if one looks at IFS, how they establish their IFS personal portal. Due to collaboration with IFS's customers, partners, suppliers and employees, the company has expanded their information network. These value creating intangibles in connection with their leading portal technology allows IFS to create comprehensive solutions at a lower cost, to empower their customers and to quickly adapt to changing business condition (IFS, 2000, p.19).

In 1997, the company showed marketing expansion activity, which was also accomplished through acquisitions and collaboration. Furthermore, the company saw its business systems sector as multidimensional as it allowed the company to form dimensions such as licenses and service content. These marketing activities and strategies can also be regarded as marketing focused intangibles (Cambridge Association, 2000). For example during the IT boom period, a lot of dotcom companies were established and IFS had business with those start up companies. But during the IT bust period, the majority of their businesses with those dotcom companies disappeared due to the fact that they went into bankruptcy. For that reason, IFS have changed their marketing focus to other business sector.

- **Micronic:** In 1999, the Company had divided the R&D function into four divisions in order to get faster decision making. This shows the ambition of the Company to serve the customers as closely and as quickly as possible. Taking the expanding local presence and continuous restructuring of divisions into account, organizational structure can easily be added to our analysis as a value creating intangible asset. The local presence of the Company, among others, is an important factor for the Company in achieving 100% market share in display segments and 10% share in the semiconductor segment (between 2000 and 2001).

Micronic also has a marketing process that enables each machine to be designed in detail in accordance with the customer's requirement. The project managers are involved throughout the whole production process, beginning from the contract with the customer for the delivery of a specific machine and ending with the customer's final approval.

- **Telelogic:** In recent years, Telelogic has had a strategy to acquire companies for their technology and to achieve a broader product portfolio. This is why between 1998 and 2000, the Company made 11 acquisitions; resulting in five consultant companies situated in Europe, one distributor in Germany and five providers of different tools such as requirement management and configuration management. The Company has also distributors and sales offices in the European, American and Asian-Pacific regions.

6.4.2.2 Human capital

“In terms of employees, we have invested more into training and development for new employees during the boom compared to bust...” (Sundeline, Telelogic, 2002)

- **IFS:** In order to create human capital, IFS has established training and development programs, which enabled their employees to specialise in their field. This happened prior to the IT boom period. During the boom period, IFS encouraged their employees to take freedom working wise combined with responsibility. Due to the high degree of autonomy, freedom of action and the staff's responsibility, creativity is acquired. Further exchange programs were established during the IT boom, so that employees could gain more international experience, which goes in line with IFS's market expansion strategy. According to the findings of IFS, the skills of consultancies are important to the company in such a way that their business orientation, technical skills and how they associate with customers are business driving factors. Also, credit is given to the competences and expertise of the staff. During 2001 these competencies and an employee's training experience were put in a competence

database in order for IFS to fully utilize their skill. Overall it can be said that during the bust time, employees were still encouraged to take part in training programmes and technology courses. This is perhaps because the company wanted to be in a competitive position and therefore had to train their employees to meet the change of the market demand. So it can be concluded that IFS has further strengthen their human capital.

- **Micronic:** The employee turnover in Micronic is 8%. During the boom and bust period, Micronic launched seven warrant programs, six of which were aimed at its employees. At the end of 2001, only 20% of these warrants were not allocated which shows a great confidence at the company by its employees and makes human capital a very important value creating intangible asset of the Company.

In 2001, four employees were awarded SEMI (Semiconductor Equipment and Materials International) awards. SEMI is an association of over 2,400 companies in the semiconductor and flat-panel display markets. Micronic is now the first European company that has the SEMI award.

- **Telelogic:** After the Company was listed in 1999, the first option program was implemented. Since then, employees have been offered options on eight occasions. The first issue had an exercise date in 2001, where the majority holders chose their options converted for stocks.

But during 2001, Telelogic implemented an action program that included wage cuts. This action was mandatory for management and personnel in the US, but voluntary for others. 70% of personnel participate in the action program. Telelogic claims that the wages will be returned to their original level when the predetermined objectives for profitability are achieved with an absolute date of October 1, 2002. The participation in the wage cut program shows the faith and high expectations of employees in the company's future.

6.4.2.3 Culture

“During the bust period, everything was wiped out. This in turn created bad spirit for the company...” (Sundeline, Telelogic, 2002)

- **IFS:** During the IT boom and bust, IFS’s culture, defined by them as professionalism, commitment and simplicity has not quite changed that much. Towards the IT boom, the Company has placed value on professionalism, such as the working style of a consultant. Towards the IT bust, this has pretty much remained the same. However, what is important or what has changed is that IFS has become more of a learning organization. This was accomplished according to i.e. sending their employees to work abroad and gain different cultural experience. However, as IFS becomes larger and larger, they have tried hard to understand how, for example, the working style is different in other countries as compared to Sweden.

- **Micronic:** During the IT boom and bust period, the Company did not change any factor of its cultural intangibles, which are defined as commitment, global presence and technological expertise. In fact, the focus was given to commitments. The idea was to have an atmosphere, which was more open and relaxing to encourage innovative working. That is therefore, the Company had divided the R&D function into four divisions in 1999 and integrated their global staff into this structure.

- **Telelogic:** There are two factors, which can be observed from the IT boom and bust era. First of all, during the boom period, the company acquired other companies because of the culture and spirit of the people (Sundeline, 2002). Secondly, while during the bust period, Telelogic’s employees were willing to take a salary cut to help the company to overcome the difficult period (Telelogic, 2001) as it was in their culture or belief to assist the company. This demonstrates that the culture has played an important part during the IT crisis for Telelogic.

6.5 SUMMARY

We have identified the value creating intangible factors of IFS, Micronic and Telelogic and have grouped them under reported intangibles and unreported intangibles during our analysis. The reason is that we found during the empirical analysis and interviews that intangibles are just not simply R&D, goodwill and IPR, but also comprise for example organizational capital, human capital and culture. For example, in the IFS's balance sheet, R&D and goodwill are classified under intangibles, however, IFS's organizational capital such as strategic alliances and the 'top performing consultant' have also contributed a lot towards the value of the company's business. The key changes, which we observed were that a lot of investment has been made towards intangibles such as investments made in R&D and recruiting people during the boom. However, during the bust it can be observed that to all of these IT companies, the bottom line has become more crucial.

7 CHAPTER SEVEN - FINDINGS AND CONCLUSION

In our last chapter, findings and conclusion will be given in regards to how the value creating intangibles have affected the IT crisis. This will be accomplished in three ways. First of all, we will present our overall findings of our thesis in regards to the concept of a recurring crisis, the two kinds of intangibles (reported and unreported) and at last the key factors that we analyzed during the IT boom and bust. Following that, a conclusion will be given, where we will discuss the four points, which state that value creating intangibles do affect the IT crisis. Finally, an overall conclusion and a recommendation will be presented, which marks our empirical analysis, our findings and our conclusion.

7.1 FINDINGS

There are other factors, which we have also observed from the companies for example

- the IT Crisis is not a new phenomenon
- the two kinds of intangibles, reported and unreported are identified and
- the intangible asset (culture) assisted Telelogic through difficult time periods

The overall findings towards our thesis are as follows. First of all, the phenomenon of a crisis represents nothing new, as we know that crisis or financial crisis generally speaking have recurred during the history of the boom and bust phenomenon. Most of the time, why a crisis occurs is due to the fact that the market is speculating for a price increase and further growth. If the whole process is built up further and further, it will lead to the result of overtrading. Referring this back to our IT crisis between 1997 and 2001, it can be said that the same phenomenon occurred as investors and analysts have speculated on the growth of the IT stock prices.

Secondly, during our empirical research we came to the point that there are two kinds of intangibles, the reported and unreported intangibles. Reported ones are e.g. R&D, goodwill and IPR and the unreported ones are e.g. organizational capital, human capital and culture. However, it needs to be argued that only the reported intangibles have a value attached in their balance sheets, as compared to the unreported intangibles. As our analysis has shown, these intangibles have contributed a lot towards the company's value, but no monetary value has been attached towards it. It can be said that it is difficult to recognize such unreported intangibles and even more difficult to put a value on them.

Thirdly, there are some key factors that can be observed during the IT boom and IT bust. One of the most important factors are that during the boom, more focus was given to intangibles such as research and development, while during the bust, the bottom line was more crucial. However, in the case of all the three IT companies it can be seen that these value creating intangible factors still played a very important role during the bust.

Our findings show that there are some positive aspects of the value creating intangibles that have assisted the companies during the IT boom and bust. For example, in the case of Telelogic it can be observed that their culture is one of the most important value creating intangible factors.

This factor (culture) assisted Telelogic during the IT crisis as employees volunteered to take a salary cut to help the company during this difficult period. This kind of mentality can be compared to the Japanese style of management where employees are not only working on their own behalf, but look after the company as well.

As far as IFS is concerned it can be said that their organizational capital (strategic alliances, structure and information sharing) have also assisted the company through the IT crisis. Without these linkages it would have been difficult for IFS to e.g. access external markets and work so efficiently.

7.2 CONCLUSION

As an overall conclusion, it can be said that the value creating intangible factors have affected the IT crisis, which is derived from four main points:

- The current accounting rules are not sufficient enough for those identifying the fair value of intangible assets that are reported.

The companies that were interviewed stated that a large amount of goodwill has to be written down and that in some cases, goodwill has been proven to be worthless. That also demonstrates that the acquired companies have perhaps been paid more than their actual value. The amount of goodwill that has to be written down is reviewed annually and usually it is accomplished by auditors. The reason why the amounts that are supposed to be written down fluctuate so much from year to year may be due to the fact that the true value of the goodwill is not truly recognized by the auditors. This can be a very subjective opinion when it comes down to how much should be written down. Consequently, the Swedish IT sector for instance was faced with a loss of 7 billion SEK by the year end of 2000.

There are also some issues to be solved concerning R&D. Most of the R&D expenditures are not recognized as intangibles. A substantial part of the work of architects, engineers, artists, photographers, and scientists is now written into computers and even a software purchase is recognized as expenditure.

By not recognizing R&D as investment, the income is understated. It is necessary to look at how profit is measured in order to understand this understatement more easily:

Profit tells us two things: how much revenues exceeded costs and how much the assets have increased before any cash is distributed to shareholders. Accordingly, profit can be defined as the revenues, which are left after all expenses. Expenses, here, are the costs of goods, services, and facilities used in the production of current revenue. The assets- that a firm buys and which are not used up in production are investments, not expenses, and are

capitalized. An investment gives rise to an expense only to the extent that its value as a capital asset falls while in use, which is called depreciation. So, it is quickly understood that the measurement of corporate earnings depends on how investments and assets are defined.

Furthermore, companies do not disclose enough information about intangible assets, which leads to investors not having a good understanding about the value of the company. This can be seen by looking into the different results between the interview conducted and their financial reports. The responses from the interviews were that in terms of intangibles, aspects such as people, knowledge and culture and so on are important. But in comparison, their balance sheet classifies intangibles as e.g.. R&D and goodwill. Companies do not want to disclose their strategic components if it is not required by GAAP officially. Lynn E. Turner, the former SEC chief accountant, expressed similar concerns last year: “As the personnel has been reviewing the goodwill impairment charges recorded by certain companies, I have been surprised by the number of those companies that have not separately identified intangible assets or have represented that they could not separately value them.” (Donohue and Vallario, 2002)

The table below presents the differences between interview responses and annual report findings as regards to what the intangibles are.

Annual Reports	Interviews
Goodwill R&D IPR	Goodwill R&D IPR People, Knowledge Culture and Strategic Alliances

Table 3 Intangible Assets

- There are still no generally accepted valuation methods and accounting rules for very important value creating intangible factors, such as organizational capital, human capital and culture; which are the reason why these valuable intangible assets are not reported.

We have been discussing the increasing importance of intangible assets during our research. We have identified value creating intangible factors and divided them as reported and unreported intangible assets. However, we have seen that in the real life this discussion has typically been limited to such traditional intangibles as goodwill, intellectual property and some parts of the R&D expenses.

The three companies, which have been interviewed, have advised us that value creating intangibles have contributed to the IT crisis as there are no accounting rules at present, which give those intangibles a fair measurement. They also mentioned value creating factors that are not reported in the balance sheets, but which are intangible assets.

For instance, according to the interview with Telelogic, the director of Investor Relations states that 95 percent of the company is made up of intangibles. These intangibles do not just take the shape of goodwill and R&D, but also include people and culture. IFS's intangible asset is for instance their organizational capital, such as the links and partnerships they have formed with other organizations. All of these value creating intangibles are considered to be core values in running the business of those companies. If they are not included in the financial reports, then it can be said that the true value of those companies is shown.

- However, the stock markets recognize the value creating factors of unreported intangibles, even if financial accounting does not.

For example, the stock market recognizes that R&D investments generate future profits. That is why investment in R&D generally makes stock prices rise. This is another reason why R&D expenditures should be capitalized. Only then, the book value of assets would be a better guide to the true value of a corporation.

In some industries R&D expenditures are capitalized. For example, in the film industry, the expenses of making a movie are capitalized and then depreciated over the commercial life of the property. If investments as risky as films can be capitalized and depreciated, there seems little reason to believe that an acceptable estimate cannot be made for R&D expenditures.

- The speculation, which arises from the valuation of stock markets and lack of knowledge leads to boom and bust. Since this valuation is based on knowledge or lack of knowledge, investors and analysts have at once overvalued IT stocks during the boom and undervalued IT stocks during the bust. Consequently, stock prices went up and down.

What we can also learn from the IT crisis is that speculation comes also with the fact that one does not truly understand what happens but still speculates on intangibles. As Kindleberger (1977, p. 18) states, “a large group of people seeks to become rich without a real understanding of the processes involved.” For example investors and analysts do not quite understand the value creating intangibles of IT companies (reported and unreported), which leads to their action of buying and selling (mania and panic).

7.3 OVERALL CONCLUSION

This section concludes the empirical analysis, the thesis findings and the conclusion of our thesis. Our overall conclusion is that the value of intangible assets was set too high during the IT boom. Therefore a large amount of goodwill for example, has been written down during the bust. We observed that intangibles cannot be measured easily. Coming to our findings, it shows that a crisis is not a new concept; as history has proven to us that they re-occur over and over again. Then, we have identified that value creating intangibles have affected the IT Crisis between 1997 and 2001. During our empirical research, we came to know that there are two types of intangibles, the reported and the unreported intangibles. This is derived from our interviews with IFS, Micronic and Telelogic, in which the companies state that intangible assets are not only balance sheet items such as R&D, goodwill and IPR, but also consist of factors

such as organizational capital, human capital and culture. Our findings show that these intangibles played a significant role towards the success of the company. Another important point, which we learn, is that these key factors have changed over time. For instance, during the boom, companies focused more on the investments of intangibles, while during the bust, the bottom line became more crucial. However, IT companies have continued to invest in those intangibles. In a way, they are regarded as strategic components or value drivers of a firm.

In regards to how the value creating intangible assets have affected the IT Crisis, we have derived four points, which answer the question. First of all, we found that the current accounting rules were not sufficient enough to identify the reported intangibles. We discuss the issue of goodwill and how auditors have to write goodwill down as the problem arose that their true value was not recognized fully. We also mentioned that R&D is sometimes not recognized as intangibles but rather as expense. But at the same time, the IT companies do not disclose enough information either. It is perhaps that they do not want to show the value of their business components. Secondly there are still no general accepted valuation factors for very important intangibles such as organizational capital, human capital and culture. Thirdly, the market recognizes the unreported value creating factors even though financial accounting does not. For example, if the market knows that a company is making further investments into R&D, generally, what one can observe is that stock prices rise. Fourthly, the market speculates and will perhaps continue to speculate, which has led to an IT boom followed by a bust.

7.4 RECOMMENDATION

What is required is to look into the accounting principles. Currently, these practices do not really reflect the true value of IT companies, which are rich in intangible assets. In addition to that, investors, analysts and the media have also speculated in the market and thereby contributed to the IT boom and bust. In closing one can say that as long as the accounting principles do not change, the IT companies' intangible assets can never be truly valued.

7.5 RECOMMENDATION FOR FURTHER STUDIES

In our recommendation for further studies, we consider that efforts should be made in order to assess the value of intangibles such as human capital, culture, organizational capital and R&D. These efforts can take the shape of establishing new accounting rules especially addressing IT companies that carry a lot of these intangible assets. We, therefore, suggest that a further investigation in this issue can be valuable to the financial accounting world.

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APPENDIX I Extract of Interview with IFS

Name: Mr. Manni Svensson

Position: Founder, Senior Vice President, Media and Investor Relations (2001), Marketing (2000)

Employed since: 1983

How do you define intangibles? Please give a definition of them.

Basically, if you look at intangibles, we are talking about the balance sheet items such as R&D and goodwill.

From your annual report, it says that there are 46% of consultants, which we categorize under human capital. To what extent are they vital for your business?

To this question it needs to be said that there is a big difference between, for example, top performing and average consultants, in terms of their skills, personality and how they drive the business. Let's say that they have to be business orientated, acting like businessman. There are several skills, which can be stressed, (which are vital for our business) for instance technical skills, understanding of the customers, social competence etc... Furthermore, driving the business is vital such as project manager, who has to be responsible for the projects and add on consultancy work.

What significance do intangibles have in contributing towards the success of the company?

The significance lies in the competence of our staff, which is regarded to be the most important aspect. I would put them in five categories, 1) services such as international marketing, receptions, 2) the management, 3) sales and sales support, 4) consultancy and of course 5) R&D.

If one has to categorize these aspects, then the last four aspects are very important contribution to our business.

How did the IT boom and bust affected IFS's business?

During the boom era, some market segments showed very strong sales. For example, the Internet dot com sector. The boom period has also affected the management in how they looked upon cost. In terms of cost versus growth, more attention was given towards the growth aspect. In other words, it was more focused on the top-line. Of course, this also affected R&D in their development in product & services. For example, we sold SW for electronic marketplaces to 15 companies/customers out of which most were start-ups. It was good business, however only one or two of those companies are still alive.

In comparison, if you look at the bust period, it turns back to the opposite directions, there are for example losses in the dot.com customers, the availability of financing changes and the bottom-line is more crucial.

What happened to R&D?

We invested more in R&D during the boom period and hired lots of people as well.

Can you comment a little bit upon your business development and your focus currently?

It focuses on profitability and cash flow as mentioned in the annual report and emphasis is still given to R&D. However, one is also cautious in terms of expanding and ongoing developments. Overall one can say that the business strategies are different today as compared to three years ago.

Do partnership and alliances still go on in your company for the future?

Yes, it is more important than ever. Basically, more emphasis has been given over the last two years, which is a strategy, as a world class product requires more presence on the relevant market than we can have on our own, and we count on our partners to help us with our sales within the targeted markets segments.

How were these partnerships formed in the past?

It is joint effort from both sides and took the initiative of both parties. Sometimes, we approach companies, we identify the market leading companies

from relations and there are also occasions where the companies have contacted us.

What are then the criteria, in which your company chooses the alliances?

The most important criteria are the partner's presence in the different segments. We are looking to establish partnerships with partners that are global leaders within their segment, for example GE within aircraft engine services.

Let us talk about goodwill.

As you know, the rules for goodwill have changed as in the past the depreciation method was used while now a discussion with the accountants is going on as to how much it should be written down. Some companies for example, make large acquisitions and have to write a lot of goodwill down.

Was the method regarded better in the past as compared to now?

Well, in the past it was easier to understand for investors i.e. what % of goodwill had to be written down, for example 5% had to be depreciated per year.

Then the question arises, to what extent goodwill has changed during the boom to the bust period?

It is natural, that you have to write goodwill down. It also proves that some goodwill items are worthless.

To what extent do you reckon intangibles have affected the IT crisis?

There was no immediate effect, the issue was the valuation. The value set on was too high. For example, there was an acquisition where a consultant had a value 10 MSEK and it is difficult to defend that. Those deals created large amounts of goodwill, which then had to be written down by that company. Basically, you can say that the valuations were too high.

APPENDIX II Extract of Interviews with Micronic

Interview I

Name: Mr. Johan Nordqvist

Position: Director of Intellectual Property Rights

Years worked in company: 3 years

How do you define intangibles? Please give a definition of them.

My definition of intangibles is IPR. When I say IPR, I mean patents, trademarks and designs. Our company deals with patents. We do not have any trademarks or designs kept or reported as intangibles.

Does Micronic see any future development towards the end of CRT technology and the use of other technology-based products?

Yes, definitely. In some years the TV will change dimensions and capacity and this change will happen in the near future. We are just waiting for it, ready.

Does that mean that Micronic plans to leave the CRT display segment?

Yes, definitely.

How about other segments...What is the market situation at the moment?

The years 2001 and 2002 were not very successful for other display segments. But as I said, we are waiting for progress in these segments in coming years.

How about the SLM technology that Micronic developed in recent years? Do you get any feedback from the market? And is there any competition in terms of technology against SLM?

SLM is still being developed. However, we are getting more and more good feedback from our customers. That is why we decided to develop it to answer even more sophisticated needs of our customers. In presentations made with potential customers, I can say that we get good comments in almost all of them. Coming to competition...There is no competition against SLM in quality. However, there is the electron-beam technology covering the major market right now; although it does not have the precision of laser technology. So,

basically the problem is marketing at the moment and we have started to focus on that.

How many patents does Micronic have at the moment?

51. By next week the number will be 53.

How have the operations of Micronic changed or been affected during the IT crisis?

I do not have an exact answer to this. But the most obvious or the only effect I would say was the production capacity of the industry. As you know, our business is affected by the demand of the consumer market and during the IT crisis the demand decreased and resulted in lower production. Both the display and the semiconductor markets went down by 50% in production globally during this crisis.

So, to what extent do you think intangibles have affected the IT crisis?

I can not tell you to what extent. But definitely they did affect the crisis. In our industry, for example, people bought companies with large patent portfolios. The only problem was that in 2000, these patents were over valued.

Interview II

Name: Ms. Anna Ulinder

Position: Director of Investor Relations

Years worked in company: 5 years

How many subsidiaries does Micronic have at the moment? Are there any new acquisition plans? What are the criteria for a company to be acquired by Micronic?

The subsidiaries are still the same as reported in the 2001 financial reports with only one difference: The subsidiary in Taiwan is not restructured as a separate company.

No, we do not have any new acquisition plans. In fact, we did not make any acquisitions in the past. We have built all of them ourselves according to our needs.

Is that why you did not report any goodwill up till now?

Exactly.

How about intangibles? Why didn't you report any intangibles until 2000?

I can not tell you that. We had reported R&D expenses as intangibles in the past years. This year 20 MSEK technological licenses will be added as intangibles.

What is the situation with warrants to be exercised at the moment?

They are to be exercised. Of course if the employees want to.

What is the equity-asset ratio at the moment?

Well, there are no major changes in our debts. So, it should be the same as the last year's end.

How have the operations of Micronic changed or been affected during the IT crisis?

The most obvious effect was in the semiconductor industry. The visibility of the markets was much harder. That is why the production capacity decreased. However, better results are expected for the next years, meaning that the market is on the way to recovery.

APPENDIX III Extract of Interview with Telelogic

Name: Ms Catherina Sundeline,

Position: Director of Information and Investor Relations.

Years worked in company: since 1997

How do you define intangibles? Please give a definition of them.

There is no specific way, in which intangibles are defined in our company. But according to my definition, intangibles are knowledge, IPR, code in software, culture and the spirit of the people.

What significance do intangibles have in contributing towards the success of the company?

Quite a lot...As people, knowledge etc... make up approximately 95% of the value of the company, while computers etc... are not worth so much in comparison.

Human capital?

Human capital is knowledge, people etc... and can be divided into three categories such as the programmers, the sales people and the support staff, who works in marketing, finance and human resources.

Did the IT boom and bust affect Telelogic's business in any way and what have they done accordingly?

The IT crisis is still going on today and didn't end in the year 2000. Yes, in that sense the IT crisis has affected Telelogic like any other IT companies. During the boom, it was easier to recruit people. During the boom period, we recruited a lot. However, it happens that there is a wrong kind of people as they have something different in mind than what it is to be in reality. Many would like to work for IT companies, but they do not quite match.

While during the bust period, or crisis so to speak, everything was wiped up out as many people had to be fired. This, in turn, created bad spirit for the company as it has also generated a lot of bad press. Personally, I think that it would have been better if we didn't have these abnormal developments. If you are looking

into the whole boom and bust period, one can say that the developments can be summed up as neutral.

In terms of employees, we have invested more into training and development for new employees during the boom compared to the bust, but it has not benefited the existing employees. We have also invested more into R&D during the boom period, but this is due to acquisitions, and not because of the boom.

What happened to the customers? Did you lose customers during the IT bust period?

No, we didn't really lose customers as such but customers bought less than before.

What happened in regards to your business development unit, what does this division do?

We actually do not have such a unit any longer, there are two people working for mergers and acquisitions. This is just to acquire companies and this unit was meant to hide MOA.

Does the international merger trend in the industries that Telelogic operates still continue?

There were many acquisitions going on in the past, but now, the company is no longer participating in any mergers and acquisitions any more.

What is actually done to get a contract with a manufacturer?

Did you mean suppliers? Well, we have only few suppliers as we are not really manufacturing. We are not buying externally.

Is there further development in the standardisation of one tool for the whole aero defence industry? If yes, where does Telelogic stand position wise?

There are developments going on within the standardisation process. However, such a development will take a long period of time and will continue. It is difficult to say as Telelogic has to change plans and technology to meet market and customers' demand in order to adapt to it. Though we have different products, one can work with them without any problems. Different programmes can work without any difficulties with each other.

What are the future plans for financing the business: New share issue, stock options, loans, acquisitions?

Well, at the moment, this is absolutely impossible. It is very difficult to plan for the nearest future as no company will plan to next year ahead when it comes to external financing. It is a very high risk for the financier.

So what other alternatives do you have?

We just try to keep a positive cash flow right now and we are using resources of the company.

What is the strategy behind acquisitions? How do you choose the right companies and how do the new companies contribute to the business?

We acquire for the technology, the product and the people as it is cheaper to acquire people than recruit them. We also want to achieve a broader product portfolio.

What are the criteria when acquiring a company?

The criteria are the financial shape of the company, technology, product, people, culture, management and of course the price.

Of course, the price is important. But here I see that you put a lot of emphasis on people, technology etc... which are your intangibles, as we have defined above.

Yes, that's right

Is there any acquisition in the near future?

No, not at the moment.

Will goodwill be decreased again this year?

Goodwill is reviewed by auditors every quarter. But to write down? Well, it is not down to the company to judge that but the job of the auditors. We have just written down a lot of goodwill and we shouldn't need to write down so much next time. However, if you know that you will have to write it down, it has to be done quite immediately.

Can you tell me a little bit about goodwill during the boom and during the bust time and how it related to you having it to write down?

Goodwill is down to future expected cash flow and during the boom period, auditors believed that it would bring in positive future cash flow, however during the bust period; auditors had to write a lot down since it didn't perform to expectations.

What will happen to the salaries, as I was informed about the voluntary salary cut? What is the plan of the company?

The voluntary salary cut was ended in September 2002. Since then we are currently discussing on this issue for the upcoming year. Perhaps there will be a low rise, but this solely depends on the development of the company.

What is currently going on with standardisation? For example, UML version 2 and the test tool based on TTCN-3 in cooperation with Nokia?

The release of the new product UML is not completed yet, it is aiming to finish the final version by next year. The sale cycle is between 6-9 months and it depends on how it is sold.

Now coming to my final questions, we are going back to our thesis problem definition, to what extent do you think have intangibles affected the IT crisis (boom and bust)?

As you can see, the company is made up of 95% of intangibles. This in turn cannot be measured easily. What is needed is to look into the accounting principle as they only account for something tangible such as fixed assets. These practices are not assigned for IT companies and it is hard to put a value on that. No one knows the true value of the company. I don't think that it is purely the fault of the company that the IT crisis occurred. There are journalists, analysts, investors, and media etc., who all hyped up everything.

In closing it needs to be mentioned that as long as the accounting principles don't change, one can never truly value our intangibles appropriately.

APPENDIX IV Development of the IT Product

In the 1980s, literature written about the link between IT and competitive advantage stressed the importance of using information as a resource. Some writers even went as far as to speak of an information revolution and cautioned that all companies would be affected by it (Forester, 1980). The idea that IT would transform administrative processes, products, organizations and hierarchies and even the rules of competition urged many executives to start thinking about an IT strategy for their company. IT was no longer a narrow context in the responsibilities of a single department (Tavakolian, 1991). Instead it had to be understood as a valuable resource, which would be very important in creating and maintaining competitive advantage. However, one of the most important steps was the arrival of the micro-processor, which was a light-weight operating system and graphical user interface. This has led to the breakthrough for small, easy to install and operate personal computers ‘PC’s’ (Tavakolian, 1991). In contrast to the centrally controlled mainframe environment, the computer became personalized. But more important was the breakthrough of networking technologies. These enabled the corporate IS/IT environment to share information among individuals in an organization without geographical borders; to have new systems phase-in gradually and coexist with the old ones (bringing the costs down); to centralize data management, administration and support function for the entire network and finally to exploit inter-company networking so that the relation to suppliers and customers becomes much closer. As a result, the sharing of tasks between the companies in the value-chain became much more flexible.

According to Porter (1985), “Networking had impact on the whole industry structures since the small companies can get the same materials, parts and services as the big company”. One of the biggest and fastest growing parts of the IT industry is the application software industry. As application packages are becoming better, easier to use and easier to adapt to business needs, customers tend to focus on commercially available products. However, strategic systems that affect the strategic advantage of the company continue to be developed internally (Bäcklund, Uthorn, Westher, 1995).