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Environmental work and Performance indicators within the IT-industry

-a case study of Volvo IT, TeliaSonera and Sun Microsystems

Bachelor thesis

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Abstract

Bachelor thesis in Business Administration
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Title: Environmental work and Performance indicators within the IT-industry, a case study of Volvo IT, TeliaSonera and Sun Microsystems.

Background and Problem: The enormous industrial expansion that started in the period of the Second World War has caused an increase in the concentration of carbon dioxide in the atmosphere and resulted in global warming. Organizations interact within a dynamic world, dependent on the different requirements of stakeholders. The growing interest of environmental issues amongst stakeholders has forced companies to adapt to new demands and therefore take their environmental impact seriously. However, companies cannot consider environmental issues in isolation, without also consider the financial and social implications. In today's society companies have begun to realize that working environmentally friendly can be profitable. This study is done on behalf of Volvo IT. Volvo IT is initiating the process of working in a more environmentally friendly way. For this purpose Volvo IT is gathering information to be better prepared for their future environmental work.

Purpose and Method: The purpose of this thesis is to describe and analyze how Volvo IT, TeliaSonera and Sun Microsystems work today with environmental issues. The information was collected through interviews with respondents at the three organizations. By describing and analyzing how TeliaSonera and Sun Microsystems use environmental performance indicators we would like to provide Volvo IT with suggestions how they can improve their environmental work. On top of that we will also study how the environmental work affects the finances of these Information Technology-companies.

Conclusion: Volvo IT does not use environmental performance indicators. However by studying TeliaSonera and Sun Microsystems we have come to the conclusion that using environmental performance indicators could be a useful approach for Volvo IT in controlling environmental work. We have noticed that environmental work could lead to positive financial effects for the businesses, but that would depend on the type of investment chosen. Positive effects in terms of cost reductions are easier to identify as well as quantify, whilst intangible benefits such as an improved company image is more difficult to measure.

Suggestions for further studies: To study organizations in other types of businesses, such as more traditional manufacturing organizations.

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Explanation of terms

CAD	Computer Aided Design
CSR	Corporate Social Responsibility
EMS	Environmental Management Systems
Gartner Inc.	Well known IT-research and advisory company.
GHG	Greenhouse Gas
GRI	Global Reporting Initiative
ICT	The global Information and Communications Technology
IPCC	Intergovernmental Panel of Climate Change
ISO	International Organization for Standardization
IT	Information Technology
SKL	Sveriges Kommuner och Landsting
WWF	World Wildlife Fund

Abbreviations for the respondents:

Volvo IT
CEO	Chief Executive Officer
CIO	Chief Information Officer
SM	Site Manager
PQM	Process Quality Manager
QM	Quality Manager I&O

Sun Microsystems
SPM	Systems Practice Manager
VPER	Vice President of Eco Responsibility

TeliaSonera
EM	Environmental Manager
EMBPP	Environmental Manager Broadband Product and Production

1. Introduction

This chapter introduces the reader to the thesis. It starts with a background to the problem and further a discussion about the chosen subjects. The discussion ends with an explanation of the objective and the research questions. Finally delimitations are presented.

1.1 Background

The enormous industrial expansion throughout as well as after the Second World War has caused an increase in the concentration of carbon dioxide (CO_2) in the atmosphere (www.ipcc.ch). IPCC (Intergovernmental Panel of Climate Change, 2007) state that the observed rise in anthropogenic green house gases in the atmosphere, very likely has caused the global average temperature to rise, since the middle of the last century. IPCC conclude with high confidence that many physical and biological systems have noticeably been influenced by anthropogenic warming over the last three decades (Ibid).

One of the greenhouse gases[1] is carbon dioxide (CO_2). Gartner Inc, a well known IT-research and advisory company, has estimated that two percent of the global CO_2 emissions come from the global information and communications technology (ICT) (www.gartner.com). According to Gartner, the two percent of CO_2 emissions[2] can be referred to the use of telephone, both mobile and fixed, local area network (LAN), printers, office telecommunications, servers, computers and cooling. Furthermore the worldwide governmental and commercial IT and telecommunications infrastructure as well as the energy in devices of large volumes are also accounted for in these percentages (Ibid). World Wildlife Fund (WWF), state in their report "Sustainability at the speed of light" (2002), that ICT products are far from being environmentally friendly (www.wwf.se). Climate change is the result of green house gas emissions. CO_2 is the most significant greenhouse gas both in terms of emissions caused by the humans and the long life time in the atmosphere (Ibid). The sources from emissions are primarily burning of fossil fuels as well as deforestation and land use changes. Environmental impacts of the chemical emissions depends on how the chemicals are spread, its toxicity, persistence, concentration, whether they can bio-accumulate as well as its capability to react with other substances (Ibid). Greenpeace state in their report "Cutting Edge Contamination- a study of environmental pollution during the manufacture of electronic products" that within the society the use of electronic products is widespread (www.greenpeace.org). Greenpeace investigated three sectors: Printed Wiring Board (PWB) manufacture, semiconductor, chip manufacture and component assembly. Where samples could be collected, the results of the study highlighted releases of hazardous chemicals to the immediate environments around manufacturing facilities, leading to contamination. Negative aspects of the ICT industry are therefore the chemicals used in the equipment and emissions generated by the manufacturing and utilization of IT-devices and also from the distribution and discarding (Ibid).

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1 Green house gases covered by the Kyoto Protocol: CO_2, Carbon dioxide, CH_4, Methane, N_2O, Nitrous Oxide HFCs, Hydroflourcarbons, PFCs- Perflourcarbons, SF_6, Sulfurhexaflouride. Green house gases not included in the Kyoto Protocol: H_2O, Water vapor, naturally occurring green house gas. (www.europa.eu)

2 The two percentages CO_2 are expressed in CO_2 equivalents. "CO_2 equivalent = the amount of a green house gas expressed in the amount of CO_2, corresponding to the same global warming potential." (www.regeringen.se 1)

However there are positive aspects of ICT industry. Jonas Kjellstrand at Gartner remarked that the percentages of CO_2 emissions that the ICT industry is responsible for, can help the other 98 percent to become more environmentally friendly and decrease greenhouse gas emissions (Green IT Seminar 2008). WWF (2002) state in their report "Sustainability at the speed of light" that because of the ecological catastrophe threatening our planet we should consider ICT (www.wwf.se). ICT can contribute to a shift towards a sustainable development[3], it is a tool that can change the way communities work, for example by generating new and better technical solutions (Ibid). Virtual meetings are one of these solutions. According to WWF there are several arguments supporting that virtual meetings can substitute business travel to a large extent. When business travels decrease, the emissions of CO_2 will do the same. Organizations more and more use virtual meetings, the prime cause of that is the time saving aspect they provide. Another positive aspect is that internet provides electronic versions of textbooks, encyclopedia and brochures, and when more people read the electronic versions, instead of paper versions, environmental savings can be great (Ibid). Peter Andell, vice president of inbound business and logistics development at Volvo Logistics, explained that IT has a distinct impact in the streamlining of the logistics flow, resulting in monetary savings as well as environmental savings (Green IT 2008).

Gartner claims that intense media coverage has increased the awareness of climate change. This has affected business and consumer buying decisions, therefore it is risky for the business to neglect and to do nothing (www.gartner.com). Consequently there is no question about whether the business needs to be bothered or not. According to the statement by Simon Mingay at Gartner's website, it will be compulsory for IT-organizations to become more environmentally friendly during the coming years. ICT industry will need to innovate to decrease their environmental impact, as well as getting a great comprehension of the full life cycle of its products. The reason for this is the growing environmental, financial, legislative and risk-related demands (Ibid).

Today, environmental issues are a major discussion in the society. Consumers have become more concerned of the environment and therefore more aware of the environmental impact of the products they buy (Epstein 1996:xix). The growing interest of environmental issues amongst stakeholders has forced companies to adapt to the new demands and therefore take their environmental impact seriously (Terrvik 2001:1). However, companies cannot consider environmental issues in isolation, without also regarding the financial and social implications. It is important to lower environmental impact as well as being profitable. In today's society companies realize that it can be profitable to work environmentally friendly (Ibid). Esty & Winston (2006:18) state that no corporation, whatever business and size, wherever they operate, can neglect the environmental issues. Moreover there are benefits inter-connected with environmental work, for example, new markets, competitive advantage, innovative culture as well as attracting the best people (Ibid). Epstein (1996:xix) concludes that environmental work is positive for the long term profitability of the companies and could turn out to be "Big Business". Organizations have shifted their view from seeing environmental work as something linked with costs to something that generates benefits.

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[3] "Meeting the needs of the present without compromising the ability of future generations to meet their own needs" (Our common future, the 1987 report of the World commission on Environment and Development).

1.2 Problem discussion

Volvo IT, part of Volvo Group, is a global actor who creates solutions and IT-systems. Volvo IT is initiating the process of working in a more environmentally friendly way. For this purpose Volvo IT is gathering information to be better prepared for their future environmental work Environmental work is called "Green IT" within the Information and Communications Technology industry. This study is focused on IT-companies and their environmental considerations, from a management control perspective. The earlier description illustrated that there is a great focus on environmental issues in today's society. Organizations interact within a dynamic world, dependent on the different requirements of stakeholders. It is important for organizations to continuously adapt to the new demands from their surroundings (Porter & van der Linde 1995). The growing interest for environmental issues amongst stakeholders has put a pressure on organizations to work more environmentally friendly (Terrvik 2001:1). To neglect environmental considerations can have adverse affect on company image and that is why companies choose to take action. It is important to keep up with the environmental movement in order not to fall behind (Ibid).

Environmental goals and financial goals have the capability to conflict with each other (Schwarts 1997:24). For a business it would not be profitable to only make environmental investments, financial aspects must be considered. A profit organization's prime goal is to be profitable and other goals that compete with that might be omitted (Ibid). We have understood that profit organizations are striving for maximizing their profit and up to recently they have seen environmental work as costs only. Environmental work as clean up and pollution prevention can require efforts, investments and costs, affecting the competitive advantage negatively (Porter & van der Linde 1995). But properly done, environmental work also has the opportunity to reduce costs (Ibid). Today, organizations look at environmental work more positively, and as something that could generate benefits, for example through improved company image and cost reduction through minimized energy use and emissions (Epstein 1996:xix).

We are interested in studying what financial effects environmental work brings. Merchant & Van der Stede (2007:435) refers to the statement "*What you measure is what you get*". Therefore we will also discuss how Volvo IT, TeliaSonera and Sun Microsystems work today and illustrate how they control in becoming more environmentally friendly. We believe that management control can be a part of the environmental work in companies and a useful tool in helping Volvo IT develop their environmental work. For effective environmental work, coordination and clear communication are needed. Environmental work influence the finances, which is another interesting aspect; do the managers at the three organizations see any positive effects of environmental work? What costs and savings do they find while working environmentally friendly?

1.3 Research questions

1. How can the use of environmental performance indicators help IT-companies and particularly Volvo IT in their environmental work?
2. How does the environmental work affect the IT-industry financially?

1.4 Purpose of thesis

The purpose of this thesis is to describe and analyze how Volvo IT, TeliaSonera and Sun Microsystems work today with environmental issues. By describing and analyzing how TeliaSonera and Sun Microsystems use environmental performance indicators we would like to provide Volvo IT with suggestions how they can improve their environmental work. On top of that we will also study how the environmental work affects the finances of these Information Technology-companies

1.5 Delimitations

The study is limited to look at the IT-industry and three companies. Within the area of management control we will focus on the use of environmental performance indicators to control businesses. Thereby we have not focused upon the whole management control area.

2. Method

This chapter describes our work and approach in the creation of the thesis. For example, the object of study and how the information was collected are explained. The chapter ends with evaluation of the reliability and quality of the sources.

2.1 Objects of study

This study was done on behalf of Volvo IT, Quality & Process department. In order to carry out the assignment we have studied two other ICT-companies that are successful in their environmental work. A project leader for Green IT who works as an expert for the IT and Telecommunication companies within Almega, an organization for service entrepreneurs in Sweden, was contacted. She suggested TeliaSonera and Sun Microsystems, because of their progress within environmental work. TeliaSonera is a telecommunication company in the Nordic and Baltic countries and Sun Microsystems is an American processor, software and server-computer manufacturer active within the global market. The aim was to see what Volvo IT can learn from the work of these other companies. The use of environmental performance indicators and how they measure and control their work towards a more environmentally friendly business was of main interest. We also wanted to know how they experience financial effects of environmental work.

The most interesting information would probably be collected from the same type of business, namely the ICT industry. However, at first we also considered comparing with a Swedish municipality since municipalities have come a long way in the work with environmental performance indicators. This can be concluded by looking at the website of "Sveriges Ekokommuner" (www.sekom.nu) where 71 of all Sweden's municipalities are members and they are all using environmental performance indicators to measure whether their development is sustainable. Furthermore "Sveriges Kommuner & Landsting" (SKL) has been running a project about environmental performance indicators during the years 2004 – 2006 (www.skl.se 1). However we chose not to have focus upon municipalities in the empirical part, though in the frame of reference there is a piece in order to clarify that there exists a practical use of environmental performance indicators.

2.2 Study approach

This thesis is a combination of an inductive and deductive approach. According to Alvesson & Sköldberg (1994:41) an inductive approach is based on empirical data, whilst a deductive approach on the other hand has its starting point in theory. In this thesis empirical data is used, still theoretical facts and assumptions are not neglected. Trost (2005:14) explains that there are two different ways of doing a study, qualitative and quantitative. This thesis is a qualitative study. Which approach that is chosen depends on the research question. In a quantitative study the question is usually about how common and frequently a variable occur. A qualitative approach, on the other hand, is about identifying and understanding patterns and phenomenon (Ibid). Our intention is to come to an understanding of the chosen organizations and their work, therefore a qualitative approach was the most appropriate.

2.3 Data collection

We have used both *primary* and *secondary data*. According to Andersson (1998) the primary data is collected by the researcher himself, in our case it consists of interviews. Secondary data is collected by other institutions, researchers and individuals (Andersson 1998:150). We gathered secondary information from literature, articles and websites.

2.3.1 Primary Data

Primary data has mainly been used in the empirical part as we interviewed the respondents at the three companies, however primary data has been used to some extent in the frame of reference as well. Though only in the part "Practical use of environmental performance indicators" when doing an interview by e-mail with the municipality of Lidköping.

Trost (2005:12) states that qualitative interviews should be credible, relevant and correct. According to the Validity term it is important to consider credibility, meaning that it is of importance that the interview is of high quality and that that the interview questions measure the right things (Kvale 1996:88,237). Within the Reliability term a study should be firm and not be subject to coincidences, in this way it becomes trustworthy (Trost 2005:113). Trost (2005:50) states that the series of interviews are a process and it is wise to reconsider the interview guide after a few interviews seeing if changes are needed. Our guide for interviews covered broad question areas. In this way complex and comprehensive answers are received, which distinguishes a qualitative interview (Trost 2005:7). Moreover after the first interview we discussed our interview guide and if modifications were needed. We changed the areas of question slightly in order for the guide to become more relevant and valid, thereby the most important areas was focused upon.

We have done interviews by e-mail, telephone and in person. For the frame of reference part contact persons for environmental work at several municipalities were contacted by e-mail in order to get their opinions and experience of the use of environmental performance indicators. However, our empiric study mainly consists of interviews in person and by telephone. Personal interviews were done when it was possible. However if the respondents were located in another city we did interviews by telephone. If telephone interviews were not possible e-mail interviews were carried out.

Trost (2005:12) explains that the interviewer should be observant and perceptive, for example, of the vocal pitches and facial expressions of the person being interviewed. The interviews with both Sun Microsystems and TeliaSonera were done by telephone. On Volvo IT the interviews were done in person. After the respondent had given their permission the interviews were recorded in order to guarantee that all information and vocal pitches were documented correctly. For the study to be reliable it is important that the interviews are documented and understood correctly. Therefore, both of us were present during all of the interviews in order to get the most out of the interviews as possible, especially when it comes to important follow-up questions. The interviews were set up as following; one of us was responsible for asking the questions and the other one for taking notes. Follow-up questions were asked when needed. The interviewed persons were asked if mail or telephone contact could be kept in case there would be a need for further questions. Directly after every interview we sat together to discuss the interview and its contents and notes were written out fair since an interview is best remembered closely after the occasion. To ensure validity and that the right information was documented the empiric part was sent for inspection to the respective organization.

2.3.1.1 Respondents

We have done all together eight interviews. Our intention with the interviews at Volvo IT was to get an understanding of how they work today and how they could improve. We interviewed the Chief Executive Officer (CEO), who also is the Chief Information Officer (CIO) for Volvo Group, with knowledge of Volvo IT's vision and objectives. Further the Process Quality Manager (PQM) at Volvo IT and the Site Manager (SM) at Volvo IT Innovation Centre with great knowledge of the environmental work were interviewed. At last a Quality Manager I&O (QM) was interviewed to get an understanding of if and how environmental work was put into practice on lower levels. With Sun Microsystems and TeliaSonera our purpose was to interview the persons with good knowledge about their environmental work in order to get the most relevant and correct information. At TeliaSonera we interviewed the Quality & Environmental Manager (EM), whose contact information was found at their website. Some questions were not fully answered at the first interview and therefore a follow-up interview was done with the Environmental Manager Broadband Product and Production (EMBPP) at TeliaSonera. At Sun Microsystems we interviewed the Systems Practice Manager (SPM) whose contact information we got through their IT-Seminar. Follow up questions were asked by e-mail to the Vice President of Eco Responsibility (VPER) at Sun Microsystems USA, since further information was required. E-mail contact was in this case preferred since the respondent is positioned in the USA.

2.3.2 Secondary Data

Secondary data has mainly been used in the frame of reference, however in the empirical part information from the websites and reports from the companies has been used as well. Literature from earlier courses in Management Control Systems as well as literature from courses in environmental science has been used. Further literature and articles have been found by library search site "Gunda" and "Libris". The search on Libris was narrowed to the subject "Företagsekonomi", followed by the searching words "environment" and "green". To find articles, we searched data bases by the subject "Företagsekonomi" on Gundas website. Articles of importance were found in "Business Source Premier" with the words "green and competitive", "corporate social responsibility" and "global reporting initiative". Another database, the Encyclopedia of life support systems (EOLSS), was found through Gunda, by subject "Miljövetenskap". The searching word was "environmental performance indicator". We also used the Swedish encyclopedia of "Nationalencyklopedin" where searching words as "Miljöledningssystem" and "Nyckeltal" was used. Additionally, other literature and articles were found by studying the reference part of other thesis in the same area. These thesis were found on the website "www.uppsatser.se".

We have read reports from the following websites, un.org, sou.se, ippc.ch, wwf.se, greenpeace.org, iso.org, ec.europa.eu, regeringen.se, skl.se and data from the information technology research and advisory company; www.gartner.com. Some websites were found by Google searching site. Furthermore, for the empirical part, information was gathered on the websites and annual reports of Volvo IT, TeliaSonera and Sun Microsystems as a complement to the interviews.

2.4 Criticism of the sources

We have had a critical approach when using secondary as well as primary data. For example recent literature has been prioritized, though some older literature has been used as more recent literature was not available. When searching the internet a critical mind is also important. In our judgement and the fact that we have chosen both governmental as well as

well known Non Governmental Organizations (NGOs), we have taken that aspect in consideration. Furthermore we have used information from the websites of the organizations. We have been aware of that the organizations highlight themselves in a positive manner, both at their websites as well as in interviews, though our aim was to evaluate the information objectively.

3. Frame of reference

This chapter gives a description of the theories that will be used to answer the research questions. The frame of reference begins with a description of management control. In the next section goals and objectives which is an important part of management control is described. Further the reader is introduced to control tools which lead to our main focus within management control, namely performance indicators. In the next part the reader learn about the importance of the stakeholders. The chapter continues with a description of possible organizational environmental work at large. An explanation of financial effects of environmental work together with a specification of the costs and benefits that can arise through environmental work completes the chapter.

3.1 Management Control and Performance Indicators

The main purpose of management control is to provide a way of planning, controlling, coordinating and evaluating in order to reach financial as well as non-financial goals in the organization (Ax et al. 2005:48). The main task of the management control is consequently to control towards a set of goals. Vision, business idea, strategy and operational plans are the starting points for management control (Ibid). *Vision* states where you want to be in the future and how you want to be seen by customers. Hence a definition of what is to be achieved with the business. The *Business ideas* are a concept, and with the vision as a starting point it defines more exactly how to develop the business in the future. *Strategies* define more exactly how to utilize resources in the business in order to meet the organizational ideas and objectives. Further in order to clarify strategies and to create plans and guidelines for the business, main targets are broken down to sub targets in the *Operational planning* (Ibid).

3.1.1 Goals & Objectives

In an organization different goals are defined. The main purpose in an organization is to achieve and consistently work towards those different kinds of goals. One definition of a goal according to Ax et al. (2005:14) is a desirable future state of position or condition.

Earlier, most of the focus was given to financial goals such as earnings per share, net income, and return on equity. However, nowadays non-financial goals have become more important and therefore given more attention. Parameters like high quality, employee satisfaction, customer opinions, environmental effort and market share are examples of goals with non-financial characteristics. However, even though goals have non-financial characteristics they definitely have the potential to generate positive financial effects in the long run. (Ax et al. 2005:58)

The main goal in almost every company is to be profitable (Ax et al. 2005:14). To be profitable in the long term is a prerequisite for the survival of many organizations and that is why it is of such great importance. Organizations also have other goals, but profitability can be seen as the main target and other goals as sub targets. Sub targets should not conflict with the main targets since this could make the main targets more difficult to achieve (Ibid).

3.1.2 Different kind of control tools

Merchant & Van der Stede (2007) has an interesting approach in how to control work in an organization. According to Merchant & Van der Stede (2007:ch.1) management control is needed since employees ultimately act in their own interest, not always in accordance with the best interest of the company. As a part to avoid problems like personal limitation, motivational problems and lack of direction Merchant & Van der Stede (2007) present three control tools, Result Control, Action Control and Personnel Control. Result Control involves measuring performance and focuses on results achieved. By being responsible and able to control their own performance, employees also get motivated and aware of what actions to take in order to reach certain outcomes (Merchant & Van der Stede 2007:ch.2). Action Control is about making the employees act in a way that is valuable and not damaging, to the organization. Action control focuses on the specific actions taken by the employees (Merchant & Van der Stede 2007:ch.3). Personnel Control considers employees naturally too beself motivating, hardworking people, always trying to do a good work. This is achieved by designing work tasks to be motivating, employing the right kind of people and providing proper education. In this way employees act in the best interest of the organization all by their selves (Ibid). According to Merchant & Van der Stede (2007:ch.2-6) these three control tools make it easier to coordinate employees and make them act in compliance with the organizations vision, strategies and objectives.

3.1.3 Performance indicators

In effort to control towards objectives, different management control measures are of great importance. For this purpose so called performance measures or indicators are in common use. These indicators make an important part of all three control systems, Result, Action and Personnel Control, mentioned above.

Indicators consist of numbers to objects that aggregate and clarify the most important information about a certain performance, such as profit per employee. The purpose is to make the information more useful and accessible for stakeholders (www.ne.se). Indicators have important characteristics, making them useful as decision tools (Ax et al. 2005:579). The indicators make it possible to evaluate and compare performances. They provide information about the outcome of different investments and also have the capacity to make important information available in an early stage (Ibid).

The indicators are not only important measuring tools but also essential parts in communicating visions, thoughts and ideas in the company and can be used to motivate involved people (www.un.org 1). The indicators have an important role in implementing, controlling and realizing strategies (Ax et al. 2005:577). However, it is important for the indicators to be congruent with stated strategies and objectives since "what you measure is what you get" (Merchant & Van der Stede 2007:435). Hence, what is focused upon is usually achieved.

The indicators generate information in numbers, but to be more useful it is important to attach a criterion to the specific indicator. For example, a target for at least 10 percent returns on equity next year (Ax et al. 2005:581). Merchant & Van der Stede (2007:30) states that employees appreciate to have a specific target to strive for, rather than being told to "do your best". In organizations indicators are mostly used to communicate financial information about a certain economical situation. It is common that indicators such as return on capital and financial solidity are summarized in the annual report of an organization. (www.ne.se)

3.1.4 Environmental Performance Indicators

However, indicators can also have non-financial characteristics and can therefore be useful in providing data about the environmental conditions in the organization. The world's resources are limited and should be used in a more efficient way in accordance to a sustainable development (www.regeringen.se 2). Since every society and organization use energy in some way, they should also have a responsibility to contribute to a more efficient use of resources (Ibid).

Environmental performance indicators are distinguished into three categories.(Kolk 2000:169)

- **Environmental Condition Indicator (ECI)**
  This kind of indicator describes the environmental impact in local, regional, national and global scales such as climate change, and air pollution. (Kolk 2000:169).

- **Operational Performance Indicators (OPI)**
  OPI Measures the environmental impact of the organizational activities. These indicators consider both input activities such as the use of energy and resources as well as output activities such as emission and waste production. For example: Quantity of materials used per unit of product. (Kolk 2000:169).

- **Environmental Management Indicator (EMI)**
  EMI focuses on the environmental work and performances within the organization, such as environmental training, energy improvements, ISO certification, as well as environmental costs. For example: Amount of saving achieved by reduction in material use or pollution avoidance. (Kolk 2000:169)

For the organizational work, the two latter indicators are of the most interest. However there is an interconnection between the three indicator categories. This is for example recognised when environmental efforts amongst employees result in less waste produced by the company and thereby also create less environmental impact. (Jakobsson & Jakobsson 1998:72)

In the environmental field the "environmental performance indicators" have been in use for a long time as a tool to measure and control towards a more sustainable development (www.regeringen.se 2). For organizational purposes the environmental performance indicators reflect how efficiently energy and different materials are consumed in the organization. Changes over time in the indicator should reflect change in the actual environmental conditions (Ibid).

"An environmental performance indicator measures conditions of great importance to the environmental work". (www.regeringen.se 2)

The indicators provide useful information about how the different objectives for the environmental work set by management are met (Kolk 2000:169). Another important purpose is to emphasize and provide knowledge about environmental issues (www.sou.gov.se). By breaking down environmental strategies into smaller pieces the indicators makes it possible to communicate and coordinate environmental efforts even on different levels in the organization. However, for the environmental performance indicators to become useful, they have to be adjusted to the specific organization and to what is to be measured. A prerequisite to produce environmental performance indicators is access to data and statistics of what is to be measured. It is possible to give shape to different indicators that would be of interest, but it

is not possible to quantify or do any calculations before you have access to background data. (Ibid)

3.1.5 Selection criteria for indicators

Not all information is interesting neither possible to observe and therefore not all activities should be measured. First it is important to be careful when collecting information and data. According to Winograd & Farrow (Encyclopedia of Life Support Systems, EOLSS) data should be "*Accessible*", "*Reliable*" of "*High quality*" and not to "*Expensive to collect*". Furthermore Winograd & Farrow states that indicators should be "*Sensitive to change*", "*Relevant*", "*Representative*", "*Measurable*", "*Specific*", they should have "*Baselines*" and "*Targets*" and also be considerate of the "*Evolvement of costs*". At last from a user perspective it is important for the indicators to be "*Applicable*", "*Valid*", "*Backward-looking*" as well as "*Forward-looking*", possible to "*Understand*" and restricted in the amount of "*Numbers*".

3.1.6 Practical use of environmental performance indicators

The use of environmental performance indicators is especially popular and widespread within municipalities. Approximately 50 percent of the Swedish municipalities use environmental performance indicators (www.skl.se 2). "Sveriges Kommuner & Landsting" (SKL) has pursued a project in between the years 2004-2006 about making the environmental performance indicators accessible (www.skl.se 1). Throughout the project, SKL has developed 20 main and 50 additional indicators in order to facilitate the environmental work within the municipalities (Ibid). The SKL report ("Miljöindikatorer- ett stöd i miljöarbetet" 2007) states that environmental performance indicators do not always generate obvious answers, nor reflect the absolute truth, since reality is not easily translated into numbers. However the environmental performance indicators put a focus on, and create awareness of important environmental issues within the municipalities. The indicators moreover make information visible and thereby facilitate planning, decision making and discussions within the environmental work (Ibid).

In order for the indicators to be effective, the goals should be broken down into sub targets. The SKL report continues by stating that the indicators have to be connected to the municipalities' management system as well as their budgeting process. SKL's report refers to the phrase "what you measure gets managed" and explains that the indicators have to be chosen carefully as well as being easy to communicate and comprehend. In order to be able to overview the indicators, they should not be too many. The importance of showing and communicating the result and environmental progresses that the organization makes within the environmental work, is also explained in the report of SKL. It is common for environmental performance indicators to be used in annual reports of municipalities. Furthermore within municipalities environmental performance indicators are used to communicate information with different stakeholders such as organizations, companies and inhabitants within the municipality. Environmental performance indicators make comparisons between different municipalities and their efforts possible, thereby, an incentive is created to work more environmentally friendly (www.skl.se 1).

Some indicators that are used in municipalities are; CO_2 emission for different sectors (*kg per inhabitant*), waste production (*kg per inhabitant*), amount of recycled material (*kg per inhabitant*), energy use for transporting (*kWh per employee and year*), CO_2 emission for car transports (*kWh per employee*), amount of driving distance per car, amount of driving distance

per inhabitant, travels by public transport per inhabitants, amount of renewable energy per sector, amount of energy use for different sectors, total energy use for administration buildings (*MWh*), energy use within administration buildings (kWh per square meter). (www.port.se, www.skl.se 1)

Lidköping Kommun is a municipality where environmental performance indicators have been implemented. According to the e-mail interview with the Environmental strategist every administration and firm within the municipality of Lidköping has indicators for their operations. Some of the indicators are specific for a particular business function, whilst others are attached to the overall environmental performance indicators used in the municipality. The Environmental Strategist within the municipality of Lidköping states that for some of their environmental performance indicators specific targets is set. Other indicators that are not attached to targets have a purpose to inform about the current situation. Some indicators are followed up several times a year, whilst other indicators are followed up with a number of years in between. It is the Environmental Strategist within the municipality of Lidköping who is responsible for the follow up of the indicators. The Environmental Strategist states that environmental performance indicators have great importance if they are used as a tool to reach progress.

The municipality of Helsingborg also uses environmental performance indicators within their municipality (www.miljobarometern.se). In the municipality of Helsingborg the indicators are used to follow set environmental objectives and has become helpful tools in communicating information about how and if objectives are reached. Furthermore the environmental performance indicators are important in order to communicate whether they are on the right track with their environmental work (Ibid).

3.2 The importance of stakeholders

Companies interact in its surroundings with different groups, individuals and organizations that are concerned by the business activities (Kolk 2000:133). The opinions of the stakeholders are important for a company to consider, since there is an interdependence developed between an organization and its stakeholders. Therefore it has to be a balance between the goals of the organization and the opinions of stakeholders (Ax et al. 2005:38). The writers Esty & Winston (2006:258) state that it is necessary to know your stakeholders. To have a dialogue with stakeholders is of major important as well as to understand their worries and what they focus upon. Building relationships with stakeholders will pay off.

Kolk (2000:135) divides stakeholders into a primary and a secondary category, since different stakeholders are of different importance to a company. Primary stakeholders such as customers, employees, financiers, stockholders, suppliers and authorities have the highest priority for the company. Primary stakeholders participate in different transactions with the company and without these stakeholders business cannot carry on. Companies are not as dependent with their secondary stakeholders such as environmental organizations, however they are important to consider since they have a large influence on the perception of primary stakeholders. The organizational interaction with different stakeholders within their environmental work is further described (Ibid).

- Erhardsson & Björnsjö (1997:134) state that ***Customers*** are crucial for the businesses since they buy services and products. Lately customers have become much more aware of and interested in the environmental impact of their suppliers. Customers have different criteria as they choose their product and environmental attributes are becoming more and more important (Ibid:170).

- A ***Supplier*** supplies the organization with products and services. Nowadays, as organizations implement environmental work in their businesses they also influence and even require their suppliers to become more environmentally friendly (Ibid).

- ***Stockholders & management*** are also important to consider. Environmental work is not always one of their main focuses and traditionally they see environmental investments as costs, future benefits are not always reflected (Ibid:169). According to Jakobsson & Jakobsson (1998:39) management are interested in following efforts and if environmental goals are met, indicators are useful tools for this purpose.

- Environmental work is experienced to be an important part of the company image (Erhardsson & Björnsjö 1997:168). Therefore environmental issues are important also in the relation to ***Employees***. There is a great opportunity to attract well-educated and motivated staff with persistent environmental work. A positive side-effect of environmental work is a better working environment which also attracts staff. The capacity and well being of employees is an important success factor for a company (Ibid).

- For ***Financiers*** it is important to determine the repayment ability of the company. Erhardsson & Björnsjö (1997:167) states that environmental issues are important to consider as solvency is estimated. The harmfulness of business activities and the product produced are considered, when an organization is evaluated by financiers. Another evaluation criteria for financiers, is if costs due to stricter regulations might arise (Ibid).

- ***Authorities*** regulate and monitor the businesses activities. Organizations have to adjust their business activities to environmental regulations (Erhardsson & Björnsjö 1997:170).

- ***Environmental organizations*** are interested in data of environmental impact of the organization. They are important opinion-makers with great influence on other stakeholders. (Kolk 2000:134). Before these environmental organizations were seen as a threat to the business. However, today companies have realized that cooperation is a better way to approach them (Jakobsson & Jakobsson 1998:44).

3.3 Different approaches for environmental work in organizations

Businesses utilize resources and produces products and services leading to waste and emissions. Environmental work is about reducing the environmental impact of business activities. Moreover environmental management is an approach, from the strategic view, where companies deal with environmental considerations. (Kolk 2000:3)

3.3.1 Corporate Social Responsibility

The European Commission state in their Green Paper (2001) that Corporate Social Responsibility (CSR) is fundamentally a voluntary concept about corporations contributing to both an improved environment as well as a better society. Moreover it is about integrating the environmental and social aspects both in the communication with stakeholders and within the corporations' business activities. Corporations are required to supply products, in an ethical, environmentally friendly, and efficient way, that customers demand (www.ec.europa.eu 1). By doing their business activities in such a way that economic growth is strengthened as well as their competitiveness, and at the same time encourage social responsibility and guarantee environmental protection, corporations contribute to a sustainable development (Ibid). CSR is driven by the new interest, both of worry and expectations, from stakeholders because of the globalisation and the environmental problems due to economic activities (Ibid). Corporations now understand that responsible, market-oriented behaviour can lead to shareholder value as well as sustainable business success (www.trade.ec.europa.eu).

According to Fox (2007) corporations that work socially responsible can attract clients, investors, talent staff members and increase their productivity. Furthermore regulators and activists can be held back when corporations are good citizens (Ibid). CSR has both direct and indirect financial effects (www.ec.europa.eu 1). Indirect effect is growing market potential because of a greater interest from investors and customers. More productive and engaged staff members can be achieved by an improved work environment, which is a positive direct effect (Ibid).

Compliance with legislation is not what CSR is about. It is about going beyond and above that, which can add to the corporations' competitiveness. CSR can help out with development of legislation, for example about social rights, in areas where it does not exist. That will lead to a base where social responsible activities can be practised. (www.ec.europa.eu 1)

3.3.2 Global Reporting Initiative

One set of standards to report about the corporations' CSR work is Global Reporting Initiative (GRI) (Thomas 2007). United Nations Environment Programme (UNEP) has initiated a centre of corporation called the Global Reporting Initiative (www.globalreporting.org 1). GRI is a multi-stakeholder network, which consists of thousands of experts (Moore 2007). Through the slow and demanding stakeholder process all the stakeholders' needs are taken into consideration (Thomas 2007). GRI cooperates to continually improve sustainability reporting as well as transparency and accountability (Moore 2007).

GRI is a reporting framework, who publishes guidelines for voluntary sustainability reporting which consists of principles and indicators (www.globalreporting.org 2). The guidelines are helping corporations to measure and report their performance in the environmental, economic and social area (Ibid). By reporting according to the GRI framework, corporations can benchmark their performance with other companies. Corporations can also recognize their own progress and efforts over time in the area of sustainable development (Ibid). The guidelines for sustainability reporting have become a global standard since 1500 corporations worldwide are now reporting according to them (www.globalreporting.org 1.).

3.3.3 Environmental Management Systems

Environmental Management Systems (EMS) covers the entire organization and arose as a mean to guarantee congruence with regulations. It may therefore serve as an assurance that certain criteria are met. It was as a response to concerns about the environment from the society and due to the pressure in showing environmental performance. (Kolk 2000:103). The EMS facilitates the environmental work (Erhardsson & Björnsjö 1997:21). EMS is a tool that systematically identifies and evaluates the organizations environmental impact as well as organizes, controls and follows the environmental work (Kolk 2000:103). Furthermore EMS support and improve the business activities by exposing and controlling costs, risks and limitations in the organization (www.ec.europa.eu 2).

EMAS (International Management and Audit Scheme) and ISO 14001 are two examples of Environmental management systems (www.ne.se). The ISO standards are developed by the International Organization for Standardisation (ISO) who also has standards for quality management systems; ISO 9000. EMAS is developed by the European Union (Erhardsson & Björnsjö 1997:20). EMAS and ISO are supposed to help with the framing and modelling of the EMS. ISO is a series of voluntary standards and guidelines, which applies to all sectors (Ibid). ISO 14001 can be carried out by an extensive width of organizations, since the condition for the EMS to be efficient is the same for all sectors (www.ISO.org). According to Kolk (2000:103) ISO 14001 build on the Deming cycle of quality management, meaning that a predetermined working process is followed. The Deming model of quality management is usually the foundation of an EMS. Through this cycle of plan, do, check and act, continual improvement is achieved of the processes and actions the organization carry out to meet its goals (Ibid). In order to become certified to ISO a company has to spot important environmental considerations of the business activities, furthermore objectives and strategies for environmental work have to be developed and set (www.ne.se). Being certified according to ISO does not necessarily mean that the company has no environmental impact, on the other hand it means that a certain way to approach environmental considerations has been implemented (Ibid). If a company is certified, there is a requirement for auditing and follow of the efforts by external auditors periodically (Kolk 2000:112).

3.4 Costs and benefits of environmental work

The financial effects of environmental work are often underestimated. Lately it has been proved that environmental work has an important effect on costs and revenues as well as assets and liabilities (Bennett & James 1998:35). There is a greater opportunity to get support and back-up for environmental work and investments if positive financial effects are highlighted (Ibid). Benefits of environmental work are often mentioned in terms of cost reduction. However there is a great opportunity for profit as well (Ibid).

3.4.1 Costs

A cost is a financial burden defined as the expenditure required for the utilization of resources (Ax et al. 2005:25). Traditionally the main focus within environmental work has been on costs and expenditures as well as end of pipe waste and emission management (Bennett & James 1998:48). Nowadays the products' negative environmental impact during the whole life-cycle has become interesting to consider for the organization. The life-cycle costing clarifies what costs arise from buying, using, disposing and selling the product. A well designed, more efficient product, has the capacity to consume less energy, create less waste and is easier to recycle. (Ibid)

Bennett & James (1998:56-58) divide environmental costs into three main categories

3.4.1.1 Internal environmental costs
This category of costs is the easiest to measure in the organization. The category includes direct expenses linked to environmental issues. Expenditures taken that are believed to have a positive return in the future are also considered. The category is related to the Quality cost model. Within the environmental work Quality costing focuses at the costs of inefficient use of resources. Within traditional Quality costing, three types of costs are defined (Bennett & James, 1998:56). First there are costs linked to dealing with a so called *Failure* of the business. Meaning that it considers the cost of dealing with occurred environmental impact caused by the business, for example costs for clean up and handling with waste. The cost of *Monitoring* considers the costs of examine, detecting and reducing inaccuracies and processes harmful to the environment. At last the *Prevention* costs are the expenditures for avoiding environmental impact of the business activities.

3.4.1.2 External environmental costs
Slightly more difficult to quantify, is when environmental expenditure and purposes are integrated with the rest of the overall business objectives (Bennett & James, 1998:57), for example, a new investment in a more resource efficient equipment gains both environmental issues and business purposes. The extra expenditure for considering the environmental aspect is calculated by a comparison with what the cost would be if environment was not to be considered. However often there is no difference and no extra expenditure for considering the environmental aspect. (Ibid)

3.4.1.3 Environmental opportunity costs
It is stated that resources such as energy and different materials are inefficiently utilized in organizations (Bennett & James, 1998:58). An inefficient application requires more resources and costs than what is really necessary for the process and thereby brings a larger impact on the environment. The inefficiency is usually observed as the large amount of wastes produced by organizations. Waste and pollution could be seen as a sign of inefficiency. It is not possible for any corporations to reduce their wastes to zero, however much more can be done. A more efficient use of both energy and materials has the possibility to reduce both costs and the environmental impact significantly, there exist so called *opportunity costs* (Ibid). Porter & van der Linde (1995) declares that *"pollution and waste is a form of economic waste"*. Bennett & James (1998:58) conclude that taking care of waste causes extra expenditures and activities that does not provide any extra benefits for costumers. A limitation of resources and wastes will save money (Ibid).

3.4.2 Benefits

There are also great potential for organizations to profit by working environmentally friendly. Recycling is one of the most noticeable ways to get paid through environmental work by taking care of a product in a proper way (Bennett & James 1998:58). However recycling revenues are not that large. Therefore services or products offered at least to some extent with green attributes are most possible to generate great revenues in a longer perspective (Bennett & James 1998:59). Today there is a greater demand for products to be environmentally friendly, and ignoring those wishes could mean losses in market share (Ibid).

According to Bennett & James (1998:59-60) environmental work can create "intangible benefits". Not all benefits and revenues in working environmentally friendly are easy to estimate. However to consider environmental issues create important values such as improved company image, motivated employees as well as a more attractive work place for students which can provide great benefits and profit in the long run. Ignoring environmental issues could be harmful to the reputation of the organization. (Ibid)

In today's society the main concentration is on expenditures required for handling with wastes and pollution. However Porter & van der Linde (1995) declares that more focus on productivity and efficiency is needed. Money is saved and costs reduced as more efficient use of energy and materials are implemented, for example by reduced production of waste, less effort and costs are put into handling with waste and pollution (Bennett & James 1998:58). Also more efficient energy use reduces energy costs (Ibid).

Different literature emphasizes the benefit of cost projection. Organizations have had a tendency to oppose regulations and for a long time not shown any considerable interests in innovation concerning environmental issues. This conservative way of thinking has made their adjustment to new regulations costly (Porter & van der Linde 1995). Bennett & James (1998:49) state that in general it is important to estimate future costs and to get ahead of them. Environmental costs are important to consider for organizations looking into the future (Ibid). According to (Mebratu 2001) there are different environmental regulations and the future will bring more legislations and demands on environmental investments. It becomes less costly for organizations if environmental actions are taken on an early stage, postponing adjustment triggers higher costs (Ibid).

3.4.3 The benefit of competitive advantage

Since competitive advantage has a large impact on the success of the business it is important to consider, furthermore environmental progress is closely linked to competitive advantage (Porter & van der Linde 1995). Orsato & Renato (2006) state that the society appreciates environmental initiatives. However managers need to consider investments to be beneficial not only for the general public, but also for the profit of the organization (Ibid). Different environmental approaches are suitable for different kind of companies. Some companies choose to work with efficient use of resources while others strive for certification or Eco-labelling of their products (Ibid). Orsato & Renato (2006) identifies four different environmental strategies that organizations should adopt in order to reach competitive advantage and pay back. According to Orsato & Renato (2006) it is important that the environmental strategies are implemented within the overall business strategy. Otherwise there is a risk for the environmental work to be a waste of time and resources. Below the four different strategies are described.

3.4.3.1 Eco-Efficiency- This approach is about using resources more efficiently. Through this strategy a way to work is developed where business activities are constantly improved generating lower environmental impact and cost reduction. There is an opportunity to reach competitive advantage and to make money on environmental work if efficient productivity is strived for. The challenge is to find "hidden opportunities" where the resources are not used to its full potential. In a competitive perspective the Eco-Efficiency strategy is especially appropriate for organizations and businesses that produce a large amount of waste. (Orsato & Renato 2006)

3.4.3.2 Beyond Compliance Leadership- Besides efficient use of resources organizations are also interested in making their customers and the society aware of their environmental work. There is a great opportunity to reach competitive advantage through improved company image. A strong company image affects the public opinion of the company, thereby it can influence shopping habits amongst customers. Hence, corporations pursuing this strategy lay their effort on emphasizing their environmental work by paying for publication of their environmental work and certifications in EMS. Furthermore environmental investments that are unprofitable and requires extra expenditures may still be pursued in order to create a strong company image. (Orsato & Renato 2006)

3.4.3.3 Eco-Branding- This strategy is about reaching competitive advantage through differentiation, by providing products or services with unique features. A purpose with differentiating is that it is possible to put a higher price on the product, however a prerequisite for this is that the product generates some kind of extra benefit to the costumer. In the industrial market eco-branded products usually provide benefits for the costumer during the use of the product. The product might be more efficient than others as it consumes less energy and thereby create cost reductions. Furthermore for the strategy to be successful it is important that information about environmental benefits of the product is available and that the unique features of the product are hard to imitate for others. (Orsato & Renato 2006)

3.4.3.4 Environmental Cost-Leadership- By offering a low priced product on the market, competitive advantage can be reached. This last strategy states that a low price product in an environmental aspect requires a drastic product improvement. This can be achieved through dematerialization and change of materials. (Orsato & Renato 2006)

4. Empirical studies

The empirical chapter presents the three objects of study, Volvo IT, TeliaSonera and Sun Microsystems. Their work and approaches concerning their environmental work are presented as well as the usage of environmental performance indicators. On top of that, the views of the organizations on how the environmental work affects the finances of the business will be presented.

4.1 Presentation of the Organizations and the Respondents

4.1.1 Volvo IT

Volvo IT is a global actor, part of the Volvo group. Volvo Group made a separate division of their IT operations in 1967. The current organization of Volvo IT was formed in 1998 and they have grown to be a global organization (www.volvo.com 1). From being a company active in Sweden, United Kingdom, Belgium and USA in 1998, Volvo IT is now to be found all over the world, in every continent (PowerPoint, Volvo IT 1).

In the Volvo IT company presentation, it is explained that they have both internal and external customers. Internally, they are a supplier for the Volvo Group. Externally, their customers are Volvo Car Corporation as well as international enterprises such as SCA, Nobel Biocare and Skandia. Volvo IT's annual sales are about 760 million Euros (≈7.1 billion SEK-www.valutakurser.net) and their staff members and contractors are about 7000 in numbers. (www.volvo.com 2)

Volvo IT creates solutions and IT-systems for fields covering the whole industrial process (www.volvo.com 2). The first area is the *"After Market"*, consisting of for example, web technology to supply spare parts. Furthermore, *"Product Development"*, Volvo IT provides solutions and support for the complete process, involving Computer Aided Design (CAD) and life cycle management. *"Manufacturing"* is about the tasks and the material flow being improved by automating the information flow. *"Business Administration",* Volvo IT has gone into partnerships with suppliers, who provide the most recent technology in order to supply services and effective solutions for the business administration. The last field, *"Sales",* consists of solutions for follow-up with Volvo IT's customers as well as efficient electronic trade, which also are provided due to partnerships (Ibid).

4.1.1.1 Respondents
The interviews at Volvo IT were done with four persons. The Chief Information Officer (CIO) at Volvo Group who also is the Chief Executive Officer (CEO) at Volvo IT, since 2000 and now retiring was interviewed, as well as the Process Quality Manager (PQM). Furthermore the Director Tech Watch & Business Innovation Site Manager (SM) at Volvo IT Innovation Centre, and finally the Quality Manager I&O (QM).

4.1.2 TeliaSonera

In 2002 the Swedish corporation Telia and the Finish corporation Sonera unitized into TeliaSonera (www.teliasonera.com 1). TeliaSonera is a corporation within the telecommunication service business. Through IT-services in compressing and transferring information, such as sound and pictures, their customers are supplied with a way of

communicating (www.teliasonera.com 2). The present organization is operating within the Nordic Countries, the Baltic region as well as Eurasia, Spain, Turkey and Russia, a total of 18 countries (www.teliasonera.com 3).

TeliaSonera is operating under Swedish regulation and is a private corporation with stocks registered at the stock exchange in both Helsinki and Stockholm (www.teliasonera.com 2). They state that their strategy is to locate additional markets for their broadband and mobile network in order to expand. In 2007 TeliaSonera estimated that their working force were 31.292 individuals (Ibid). TeliaSonera provides their products to both individuals and corporations (www.teliasonera.com 4). Company clients represent approximately 25 percent of the total amount of turnover in TeliaSonera (Ibid). The net sales for 2007 were calculated to be 96.3 billion SEK (www.teliasonera.com 5).

4.1.2.1 Respondents
The interview at TeliaSonera was done with their Quality & Environmental Manager for TeliaSonera Sweden (EM). The respondent has worked with environmental issues at the company for nearly 10 years. A second interview was done with their Environmental Manager in Broadband Product and Production (EMBPP).

4.1.3 Sun Microsystems

Sun Microsystems Inc. started with four employees in 1982 in Mountain View, California. Today, their workforce are 37 0000 employees in 170 countries (www.se.sun.com 1). The production of Sun Microsystems' computers is taking place In Scotland and USA, whilst the Research and Development is pursued in Japan, Russia, Israel, USA, Ireland and France. Sun Microsystems has an annual turnover around 20 billion dollar ($\approx$121.3 billion SEK-www.valutakurser.net). Sun Microsystems AB started in 1988, in Sweden. At present, they are a workforce of 250, in Kista, Gothenburg, Malmo, Stockholm and Sundsvall. Sun Microsystems AB have clients within the sectors; universities, finance, authorities, media and telecommunication (Ibid).

Sun Microsystems explains at their website that their clients are global corporations as well as individuals. Their clients are supplied with computers, services, systems, microelectronics and software that drive datacenters as well as developer tools and consumer electronics (www.sun.com 2).

4.1.3.1 Respondents
The interview was done with the Systems Practice Manager at Sun Microsystems, Sweden (SPM). The respondent has worked at the company for about two years and has been speaking at Sun Microsystems' seminar about Green IT. Follow up question were asked by e-mail to the Vice President of Eco Responsibility (VPER) at Sun Microsystems Inc. He has the responsibility, across the company, for the strategy and execution of environmental initiatives.

4.2 Environmental work, Impact and Efforts

4.2.1 Volvo IT

The environmental work in Volvo Group started in the 1960's with the creation of a list where chemicals that were not allowed, or should be avoided, were specified. Furthermore, the areas of quality, safety and environment are core values within the Volvo Group (Process Quality

Manager, PQM). Volvo Groups Code of Conduct covers *Business Principles*, *Environmental Principles* as well as *Human Rights and Workplace Practices*. Volvo Group illustrates in their Code of Conduct that they are a trustworthy corporation that is committed to a sustainable development as well as to conduct their business according to the legislations and regulations. In the Volvo Groups Environmental Policy, which is the same for Volvo IT, Volvo declares that it is important to consider the whole life cycle of a product, activity or service as well as to prevent environmental impacts such as pollution and emissions. Furthermore, Volvo states that they strive to integrate environmental work within all its business activities (www.volvo.com 4).

 "Environmental work" has not been that highly prioritized in the company since Volvo IT's environmental impact is not that noticeable compared to other organizations who focuses on production (Chief Executive Officer (CEO). The PQM believes that today's environmental work at Volvo Group, most likely started from a working environment perspective, where care for the employees and their health was focused upon. The growing environmental awareness in the society has influenced the organizational culture to be more concerned about the environment (PQM). The environmental work in Volvo IT has been characterised by common sense and environmental awareness among employees, rather than driven top-down by policies. Environmental objectives or targets have not been noticed by the Quality Manager I&O (QM). Consequently, besides certifications, the environmental work has not been actively controlled within Volvo IT. Environmental management is reviewed two times a year with the Executive Management Team. Volvo IT is in the designing and information collection phase to phrase a global environmental strategy for all 35+ sites and 6500 people involved in Volvo IT operations.

The PQM explains that Volvo IT has three dimensions for their environmental work:
- The first dimension is *employees*, where rise of awareness is focused upon and for example printing, paper and energy consumption is important aspects.
- The second dimension focuses on more *efficient production* and *collaborations* solutions through for example net meetings.
- The third dimension is *developing services* and influencing solutions to become more environmentally friendly.

At Volvo IT Innovation Centre they have started with some internal environmental work at the personal level (Site Manager, SM). For example, they are only allowed to print maximum ten pages per employee and week. Furthermore they are expected to travel to work once a week, by another way of transport, instead of driving their car.

At the moment Volvo IT do not have much training concerning environmental issues for their employees besides the introduction for new employees (PQM). It is confirmed by the QM that there are no environmental training programs. However, only training would probably not be enough in order to become more considerate of environmental issues, according to the QM. Furthermore, the Site Manager at Volvo IT Innovation Centre, believes that instead of training it is more important to "learn by doing" as well as to encourage the employees.

For the environmental management 2008 (PowerPoint, Volvo IT 2), Volvo IT's environmental objectives are stated. Included in these objectives is the consumption of energy in their datacenters, the lifecycle perspective when they buy and manage products, using virtual meetings to decrease travels as well as reducing waste in their offices. The environmental objectives for 2008 also cover the areas of *Environmental Management,*

Services, Industrial Infrastructure as well as *Communication.* The objectives are for example about defining "Green IT for Volvo IT", expand the environmental certification according to the ISO 14001 standard from 10 percent employee coverage to 95 percent globally, improving the datacenters energy efficiency, to raise awareness as well as creating a network of the employees interested and active in environmental care.

4.2.1.1 Environmental Management Systems
Volvo IT is certified according to the ISO 9001, a quality standard. Volvo IT has certified their businesses in Skövde and Olofström as well as their purchasing department in Gothenburg according to the environmental standard ISO 14001. Since certification require companies to employ consultants to audit their work, resulting in expenditures, Volvo IT would only consider certifying their various departments if the customers demand it. Even though Volvo IT have not certified all their departments, the requirements for certification according to ISO 14001 are met (PQM). Due to expectations from Volvo Group and customers, Volvo IT has now decided to proceed with the certifications. The certificate has no value in itself, it is more important to establish environmental care as a mindset and within the behaviour (PQM).

4.2.1.2 Environmental impact and efforts
The PQM believes that the energy consumption of their servers, as well as their travelling and transports stand for Volvo IT's largest environmental impact. Volvo IT considers the lifecycle perspective when buying and taking care of equipment. For example when computers are finished they are taken care of, of companies which are certified according to ISO 14001 Furthermore the purchasing department at Volvo IT is ISO certificated.

The CEO verifies that environmental work is becoming of increased importance and is a prerequisite for the survival of businesses. The CEO as well as the QM believe that there will be a great opportunity to contribute to a better environment, as Volvo IT develop IT-solutions helping their customers to be more efficient. The SM at Volvo IT Innovation Centre believes that Volvo IT has a great potential in improving their environmental work..

Volvo IT is doing environmental efforts, even though it is not clearly labelled "environmental work" (QM). Their aim is to reduce costs and provide efficient solutions for customers. For example, Volvo IT helps out in making logistic solutions reducing the transports, leading to monetary savings as well as environmental savings for their users (Green IT Seminar 2008). Another example is that Volvo builds prototypes when they develop a new vehicle, but with the help of IT-solutions they are able to build the vehicles virtually, reducing the material consumption and waste (SM). Volvo IT's environmental achievements during 2007 (PowerPoint, Volvo IT 2) was for example that they have hired a Corporate Coordinator working with EMS. Furthermore the communication done internally has increased, and Volvo IT-Innovation Centre has been working on innovations with environmental considerations in focus. Volvo IT's newly built datacenter in Arendal is another example of environmental progress. When cooling the facility sea water is used, which is environmentally friendly (Green IT Seminar 2008).

The PQM confirms that they see a competitive advantage with environmental work, not only towards customers but also towards the internal and external work force as well. In the future, it is important to have a profile that attracts competent IT-personnel. The QM believes environmental work is important, however he does not think that environment is the greatest argument for customers and employees to choose Volvo IT. The PQM means that competitors

such as Dell and HP always announce and publish, when something new concerning the environment has been achieved. Of course it is a competitive advantage in announcing every environmental progress, however this is not the way to go for Volvo IT. Before Volvo IT begins their process with "Green IT" they want to know what to do. Their aim is to do it in a structured, stable way and in a long term perspective (PQM).

4.2.2 TeliaSonera

TeliaSonera has applied Corporate Social Responsibility (CSR) where the environmental work is a significant part. According to the Quality & Environmental Manager (EM) Sweden, In the 90's environmental issues and Agenda 21[4] became a major topic in the society and customers and other stakeholders began to ask for environmental management standards of TeliaSonera. However TeliaSonera states that they have been considering environmental issues for a long time, for example by taking care of waste.

The below stated information is mainly based of the Swedish business, formerly named Telia, since the TeliaSonera has only existed since 2002. According to the EM, the growing interest in the 90's amongst different stakeholders was a wake up call for Telia and they began to work more systematically with environmental issues, such as implementing a policy and setting environmental goals. The aim was to integrate environmental work with the rest of the business activities. Their first environmental objective concerned business trips, since travel is a significant part of their environmental impact. The aim was to reduce the amount of business trips with 20 percent during a three year period.

According to the EM, the lack of knowledge and competence concerning environmental issues is the major constraint for environmental work. They have seen that inadequate information and lack of competence causes poor results within environmental considerations. However through information and training, employees can learn to do the right things. For this reason Telia began to educate their employees in 1998. The employees were educated about the environmental issue at large and the environmental impact of Telia. Further they learned about how to act within their specific job assignment to become more environmentally friendly. Today TeliaSonera in Sweden also have an internet based education available for every employee. The EM describes that TeliaSonera continuously check that the individual's has carried out the web based courses and those persons are given a diploma as a reward. Besides the web based training, other environmental courses are arranged in environmental purchasing and legislations (www.teliasonera.se 6).

4.2.2.1 Environmental Management Systems
In the year of 1992 parts of the Telia organization were certified according to ISO 9000. In 2001 a management system fulfilling the demands of ISO 9001 and ISO 14001 were put into practice and also partly certified. Today a majority of their operations in Sweden are certified according to ISO 9001 and ISO14001. (www.teliasonera.com 5)

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[4] In Rio de Janeiro in June 1992 United Nations held a conference about environment and development (UNCED). The long term action program Agenda 21, was adopted by 178 Governments. Agenda 21 offers guidelines and objectives to achieve a sustainable development by extinguishing poverty and the threat to the environment. (www.un.org 2)

4.2.2.2 Environmental impact and efforts

One of TeliaSonera's largest impact on the environment is the energy consumption. According to the EM, there is much left to be done within that area. In the Annual report (2007) TeliaSonera estimated that the energy consumption stands for 56 percent of their total emissions of carbon dioxide (www.teliasonera.com 5). TeliaSonera has set up objectives for the energy use, they purchase "Green" electricity consisting of solar power, hydropower, wind power and bio power. However, in every country, green electricity is not available, though the goal is to buy it if it is possible (Ibid). The EM states that pressuring the suppliers to produce new techniques and new products consuming less energy is important. She further describes that TeliaSonera has a "phase out plan" where old equipment with high energy consumption is continuously substituted to energy efficient equipment. Another aim of TeliaSonera, where they are making progress is to turn of computers and other equipment that is not in use. There have also been reductions in the area of heating and transports. According to the Environmental Manager in Broadband Product and Production (EMBPP) efforts described above have reduced their energy consumption with more than 30 percent, since 2001.

Chemicals and other harmful substances in products are also important to consider. This issue is something that TeliaSonera discusses with their suppliers since TeliaSonera does not manufacture products themselves (www.teliasonera.se. 6). For example in the 90´s TeliaSonera formulated concrete environmental goals in negotiations with their suppliers. However the EM states that it is important to consider what requirements their suppliers are able to cope with. For this purpose TeliaSonera created a so called "black list" where substances that were not allowed to be used in the products were specified. A "grey list" was created as well, where suppliers were informed of substances with limited time of allowance. In this way suppliers were able to gradually adjust their businesses to the requirements. Furthermore the EM states that suppliers that utilize environmental managements systems are chosen before others.

Another area that affects TeliaSoneras impact on the environment is the transports and the use of company cars in installation work, as well as business trips and travelling, according to the EM. In the CSR report (2006) TeliaSonera states that they demand their employees to consider virtual meetings instead of physical travels when organizing a meeting. This is due to the environmental impact as well as costs, time and efficiency aspects (www.telia.sonera.com 7).

Material use is another important consideration and in the Annual report (2007) TeliaSonera declares that the aim is to make the material consumption more efficient in order to reduce the use of resources (www.teliasonera.com 9). The EM states one example; if a computer or a telephone gets old, the whole computer should not have to be wasted, parts of it should be reusable or at least recyclable. For this reason, the EM explains that the whole IT-industry, including TeliaSonera, should demand suppliers to take these aspects into consideration when designing products. The EM states that in the end of the 90´s Telia reached a special agreement with different suppliers to take care of their harmful waste in a proper way. Telia demanded that these companies should be ISO certified and that the waste should stay within the borders of Sweden. To ensure that the companies pursue these agreements, TeliaSonera in Sweden have internal auditors that inspect the companies on a regular basis.

In the CSR report (2006) it is stated that some of TeliaSonera's main environmental goals are to improve energy efficiency within the telecom network and to increase the use of TeliaSonera's products and services among customers (www.teliasonera.com. 7). According

to the EM it is important to share knowledge and to educate customers about TeliaSonera's products and how they can make their businesses more efficient and reduce CO_2 emission. The EM describes that besides evaluating their impact on the environment TeliaSonera also considers the whole life cycle impact of their business. They have done several life cycle assessments in order to improve their IT-product, but also to illustrate the benefits of using the IT-product (www.teliasonera.se. 6).

4.2.3 Sun Microsystems

According to the interview with the Systems Practice Manager (SPM) at Sun Microsystems, the environmental work has arisen from the environmental problems in California, USA. Furthermore he believes that the environmental work has grown organically, from the inside. For example, Sun Microsystems has been recycling at their facilities for a long time.

The Executive Vice President for Global Sales and Services at Sun, states in a newsletter in November 2007 that the strategy for Corporate and Social Responsibility (CSR) is integrated in their business objectives. The SCR strategy is integrated to pursue change in three ways; ecologic, social and economic. Moreover he believes that stakeholders more and more see CSR and environmental problems as an important factor in buying decisions and investments (www.sun.com 3). The SPM explains that Sun Microsystems pressures their sub-tractors to certify their businesses according to the environmental standards by ISO. Sun Microsystems also expects their sub-tractors to apply CSR, and to compose a CSR report. That in turn, could result in the sub-tractors to put pressure on their sub-tractors.

Sun Microsystems' strategy for their social responsibility work is *Innovate, Act* and *Share* (www.sun.com 4). First of all, *Innovate* means that Sun Microsystems finds a possibility or a solution for a problem, which is a problem of their own or a problem of their customers' according to the SPM. Further, Sun Microsystems state that they provide their clients with environmentally friendly products and services (Sun Microsystems' Green IT Seminar 2008). *Act* means that Sun Microsystems pursues conscious and environmentally friendly operations. For example, at their workplace, they recycle and separate at source. It is also possible to work from home, which reduces travelling (Sun Microsystems' Green IT Seminar 2008). Sun Microsystems also states that they obligate themselves to operate in conformity with the top business conduct principles (www.sun.com 4). Sun Microsystems applies transparency to the environmental challenge, and show their performance and progress for their stakeholders. The SPM explains that Sun Microsystems often tries their innovations first, and afterwards *Share* and communicates their knowledge to customers and the world at large. Sun Microsystems is also trying to embrace knowledge from others, who are accomplishing a change for the better (Ibid). Sun Microsystems educates their staff continuously when they are launching new products or services. The SPM declares that their aim is that environmental considerations show in all their actions.

4.2.3.1 Environmental Management Systems
Sun Microsystems explains in their CSR report that the contract suppliers as well as the production facilities of Sun Microsystems' are certified according to the environmental management system ISO 14001. The certification process includes continual improvement, the chosen fields within Sun Microsystems is amongst others, Contractor Safety and energy conservation in USA, as well as Electricity and Natural Gas usage in Scotland (www.sun.com 5). ISO 14001 consist of Health, Safety and Environment policy, furthermore the process involves setting goals, measuring and monitoring as well as repeated reviews. The

implementation of an EMS is done in order to certify conformity with legislation and codes but also to supply a work environment that is both environmentally friendly and safe. (www.sun.com 6)

4.2.3.2 Environmental impact and efforts

Vice President of Eco Responsibility (VPER) states that the part of Sun Microsystems that generates the most impact on the environment is the energy consumption of their products at the customer's. It is more than five times the impact of either their internal operations or their supply chain. The SPM believes that Sun Microsystems' productions as well as their sub-tractors production have a considerable impact on the environment as well.

Sun Microsystems has named their environmental work as "Eco responsibility" which is a part in their overall CSR strategy and consists of the areas "**Greening our Business**", "**Products & Services**" and "**Product Life Cycle**".

With "**Greening Our Business**" Sun Microsystems means minimizing the impact on the environment from their business. Greening our business includes: *Carbon Footprint*[5], *Alternative Energy*, *Greening Datacenters*, *Recycling*, *Facility Certification* and *Open Work* (www.sun.com 7). Sun Microsystems measures and works towards decreasing their *Carbon footprint,* for example by decreased energy use as well as using alternative, renewable power (Ibid). Energy use is the single source that has the most prominent affect on Sun Microsystems' carbon footprint, contributing with over 90 percent (Ibid). Sun Microsystems expects that decreased energy costs can be achieved when there is a marketplace for *Alternative, renewable energy*. They believe that this is accomplished through investments in alternative energy (www.sun.com 8). *Greening datacenters* is about that the datacenters of Sun Microsystems' are responsible for a considerable amount of their total energy consumption (www.sun.com 9). Sun Microsystems is working towards decreasing the energy consumption and reducing their emissions of CO_2 and at the same time cost reduction is achieved (Ibid). They have set up *recycling* programs (www.sun.com 10). Sun Microsystems' program includes waste avoidance and recycling of for example, paper, cardboard, batteries and computer equipment (Ibid). *Facility certification,* see Environmental Management Systems. The *open work* efforts have, amongst other things, resulted in decreased travelling as employees can work from home, consequently less office space is needed and thereby energy savings as well as decreases in CO_2 emissions is attained within Sun. (www.sun.com 1)

The area "**Products & Services**" consist of *eco innovation* which is about developing and offering eco responsible products that for example are energy efficient (www.sun.com 12). They offer a "3-step approach" for the datacenters to become more environmentally friendly (www.sun.com 13). The first step, *assessment*, is about reducing operational expenses by improving cooling and energy consumption as well as using space more efficiently (www.sun.com 13). The second step, *optimizing*, is about making datacenters more efficient and at the same time remove e-waste and recycle the devices (www.sun.com 14). The final step, *virtualization*, help Sun Microsystems' clients to reduce the environmental impact by using the IT-equipment optimally (www.sun.com 15).

"*Energy star*" is a logo for computers that meet the criteria of being energy-efficient (www.sun.com 16). Sun Microsystems has been working together with the Environmental

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[5] Carbon footprint= Calculation for environmental impact in carbon dioxide units, caused by anthropogenic activities (www.carbonfootprint.com)

Protection Agency in USA to develop this new specification. They now have the logo on some of their products such as monitors and workstations (Ibid).

"**Product life cycle**" is about the planning, designing and production unto the end of the products' life (www.sun.com 17). In these stages, impact on the environment is decreased, for example by supervision of materials in the production as well as decrease the garbage produced (Ibid). Moreover they have set a goal which means that equipment that finish in a waste stream should not be more then five percent. Further it is stated that they have a return program where users can hand back the products to them, and they take care of it appropriately (Ibid).

4.3 The use of Control and Environmental Performance Indicators

4.3.1 Volvo IT

Volvo IT is measuring certain areas and they utilize that information when they evaluate themselves as well as in comparison with their competitors. Continuously, they measure operating costs, customer satisfaction and quality. (www.volvo.com 2) However environmental performance indicators are not in use in Volvo IT (Product Quality Manager, PQM). Though they are eager to utilize environmental performance indicators and believe that it will become necessary within their environmental work (PQM). The PQM wants every employee to think about the environment in their work, and communication could be a tool to achieve that. Much is done already concerning environmental issues, however they need to communicate it better because communication creates awareness (PQM). Moreover the Site Manager (SM) at Volvo IT Innovation Centre believes that the use of environmental performance indicators will raise awareness as the environmental issues are put on the agenda. The Quality Manager I&O (QM) confirms that measurements, targets and follow-up could be a way to go, however the communication has to be clear of what is to be achieved and why, since efforts cost time and money. The Site Manager believes that it is important to find environmental performance indicators which the management values as highly as the financial performance indicators since commitment from the management is of great importance. Furthermore it is important that the work staff have goals and indicators to work towards. The Chief Executive Officer (CEO) confirms that what you measure gets improved, though it is important to measure the right things and it is important not to be overwhelmed by numbers.

4.3.2 TeliaSonera

TeliaSonera uses Environmental performance indicators to evaluate and control environmental work. Furthermore in line with their CSR work they are expected to produce information and indicators on yearly basis according to the guidelines of the Global Reporting Initiative (www.teliasonera.com 8). TeliaSonera have a number of environmental performance indicators that they follow. According to the Quality & Environmental Manager (EM) the keep of statistics started for certain measurements in 2001 and has become a natural reference point for many indicators. The Environmental Manager Broadband Product and Production (EMBPP) declares that the base for the use of indicators has its starting point from the GRI reporting. However the EMBPP believes that the GRI report mainly presents more general indicators such as CO_2 emission and waste, which provide quite comprehensive and blunt numbers that are hard to break down to the rest of the business activities. Therefore

TeliaSonera utilizes more detailed indicators, and there is a main focus on such as *travelling, the use of telecommunications network* and *energy efficiency* since these activities have a considerable environmental impact within their business.

The EMBPP refers to the statement "*what you do not measure, does not exist*". He states that it is not enough only to discuss what should be done, something more is needed and you get better results through measuring and evaluating efforts. Through setting targets and measuring, managers are able to evaluate and follow environmental work in TeliaSonera. Through a scorecard it is agreed upon what environmental objectives and targets are to be met during the year. However not all indicators are attached to targets. Objectives are or have been mainly set for energy use, transporting, travelling and virtual meeting. For environmental educations they have no targets, on the other hand there are requirements connected to the ISO certification, that employees should be educated to a reasonable basic extent. The EMBPP says that indicators and objectives are mainly set on corporate and unit levels. There are not many indicators for individual performances. However he states that it is important to break down indicators in order to control and make sure that the activities of the staff supports the set objectives. Communication, competence and clarification of consequences are therefore important.

In the travelling area indicators are for example, "*the amount of trips*", "*travel per employee*", "*travel in kilometres*", "*costs for travelling*", "*the use of rental cars per 10 kilometres*", "*taxi trips per kilometre*", "*costs for taxi trips per kilometre*", "*the use of car in duty*", "*the use of how many kilometres car with special offer has been driven*", "*entrepreneurial travelling*", "*amount of air travel per year*" and "*air travels per employee*". In between 2001-2007, TeliaSonera in Sweden calculated that the air travel within the organization decreased with approximately 56 percent according to the EM. She explains that "*Air travels per employee*" during these six years have decreased with 41 percent. Furthermore the amount of virtual meetings are measured and followed for example; the "*amount of telephone meeting a year per employee*". The EM says that TeliaSonera in Sweden calculated that the amount of telephone meetings a year per employee has increased from seven to eighteen 2001-2007. According to the Annual Report (2007) virtual meetings in some kind has made it possible to reduce travelling and transporting on the whole with approximately 40 percent between 2001 and 2007 (www.teliasonera.com 5). According EMBPP it is estimated that the travelling continuously decreases in TeliaSonera and the virtual meetings are increasing. The EM explains that TeliaSonera has done a survey among their employees and came to the conclusion that the employees appreciates the increased use of IT to communicate with each other instead of travelling. This gives them the opportunities to organize their working time in a better way and consequently makes them more efficient. In the CSR report (2006) it is stated that TeliaSonera has developed a computer based system which makes it possible to study costs of travelling and environmental impact within the business (www.teliasonera.se 6). Through this instrument it has become possible to survey and evaluate travelling habits and progresses as low as on group manager level. The employees' transportation habits to work have also been studied (Ibid).

The energy use is another important consideration, mainly in their telecommunications network. For this purpose, indicators for the use of electricity are utilized. In the Swedish business an index measuring energy efficiency is used according to the EMBPP. The energy index is a model based on a sort of life cycle based methodology. He declares that the purpose with the energy index is to relate use of electricity with the work done in order to evaluate changes in efficiency. The energy index is developed in accordance with the overall business

objective "*to be more efficient*". The index consists of as well as compiles several indicators. In the energy index parameters such as: The *capacity* for the long distanced network, traffic generated on the mobile network "*volume traffic minutes*", the fixed network "*number of calls*" and the broadband network "*number of possible subscribers*" is measured (TeliaSonera, PowerPoint-*Energy index*). The progresses in the capacity of these different networks are calculated, followed and evaluated over time. The development of the capacity in the networks is then compared with the development of the "*total use of energy*" (*in GWh*) in the business. Since the different parts demands different amount of energy the calculations are compiled in an energy efficiency index. Consequently in this index, services produced are weighted against the use of electricity in the business. More exactly; "*the amount of energy demanded by the system for every unit of service produced to clients*". The EMBPP explains that since the measuring started in 2001 the capacity for individual parts like mobile and broadband network has increased with about 300-400 percent. On average the capacity for all parts has increased with approximately 40 percent and during the same time the electricity use has only increased with 6 percent which they define as very low compared to the raise in capacity. He states that use of electricity is calculated for in every location, where electricity meters are available. However electricity that comes with the rent is not measured.

According to the EMBPP it is through the index and the measurements that more efficient use of energy is reached. Targets, such as reaching energy efficiency for at least 3 percent, are attached to the index. Thereby, focus, activities and efforts are controlled in order to reach this target. The electricity use of TeliaSonera in Sweden is efficient, probably thanks to their focus on the issue according to the EMBPP. He states that the efficiency index is not a complete picture of the reality. However it is the best available indicator for showing that activities are on the right track and that efforts create effects.

Furthermore measurements have been done to evaluate the development of *office space*. The GRI report (2006) states that since 2001 office space has been reduced by 50 percent due to the increase in virtual meetings (www.teliasonera.com 9). There are also follow-ups in the use of *renewable electricity* and in 2006 the amount of eco-energy was calculated to 54 percent (Ibid). *Material use* is another measurement. For example in Denmark printers writing on both sides has been in use, which is standards for all operations. Calculations reveal that there has been a decrease in the use of papers by approximately 40 percent (Ibid). In the CSR report (2006) it is stated that through reduced office space for every employee, efforts in reducing the use of energy, reduced travelling, alternative meeting arrangements etcetera, the CO_2 emission was reduced with overall 50 percent in 2001-2005 (www.teliasonera.com 7). According to TeliaSonera this has been "confirmed externally".

4.3.3 Sun Microsystems

The Vice President of Eco Responsibility (VPER) explains that Sun Microsystems has several goals, and that almost all of them are specific to particular projects. Within their environmental work named "Eco responsibility", they are continually working towards improvements, and have goals for the areas explained earlier; "*Greening our Business*", "*Products & Services*" and "*Product Life.* An example, stated by the VPER, is lower energy use in datacenters by 40 percent. Additionally, Sun Microsystems has spotted projects in order to reduce their energy costs with four percent per year (www.sun.com 18). In Santa Clara, USA, the energy costs were cut with 60 percent by consolidating hardware and re-designing data centres (www.sun.com 9). When decreasing their energy consumption, Sun Microsystems gets a refund from the government in the USA (Ibid). Due to their Open Work

program the possession of office area has decreased with 2.6 million square feet which corresponds to 15 percent, during the fiscal year 2007 (www.sun.com 18). Furthermore they have goals for their GHG emissions; between 2002 and 2012, the emissions of greenhouse gases by the U.S operations should decrease by 20 percents. By the end of year 2006 they had reduced the GHG emissions from their businesses in USA with 6.5 percent (www.sun.com 19). Sun Microsystems also has goals to increase the use of renewable energy as well as to decrease energy consumption in their buildings (Ibid). These goals are continually and closely followed, according to the SPM. In USA, Sun Microsystems' business is larger than the business in Sweden. In the United States they have production, research and development and more employees, the environmental impact is substantial and larger than the impact of the business in Sweden. Therefore, they have focused more on goals and indicators for their operations in USA. The VPER believes that in the future, there will be goals in more areas and also tougher goals in the areas where they already have them.

The Systems Practice Manager (SPM) states that in the department of product development in Sweden they look at to what extent the products are recyclable. They are also trying to cut down business travels, because it is expensive, instead they use net meetings. It is the same with energy efficiency. In Stockholm they have reduced their office area by 50 percent, which resulted in reduced energy use. The follow-up of their goals and indicators takes place higher up in the organization where they have good knowledge, according to the SPM.

Sun Microsystems is using indicators from the GRI guidelines within their CSR report 2007. According to the VPER, they use the GRI guidelines as a "master list" of possible things to report. They come up with things off, of the list as well, but they want to make sure they are getting as much of the list as is reasonable for their business. Sun Microsystems has indicators related to the Environment, Labour Practices and Decent Work, Economic Performance, Human Rights, Product Responsibility and Society (www.sun.com 20). The SPM finds that the GRI reporting is helpful in dialogue with customers. The indicators show for example improvements in emissions of GHG, energy savings and efficiency. Examples of environmental performance indicators according to the GRI guidelines, Sun Microsystems' Eco Responsibility are *"Direct energy consumption by primary energy source"*, *"Indirect energy consumption by primary source"*, *"Energy saved due to conservation and efficiency improvements"*, *"Initiatives to reduce indirect energy consumption"*, *"Total direct and indirect GHG emissions by weigh"*, *"Initiatives to reduce GHGs and reductions achieve"*, *"Initiatives to mitigate environmental impacts of products and services"*, *"Initiatives to provide energy efficient or renewable-based products and services, and reductions in energy requirements as a result of these initiatives"*, *"Initiatives to mitigate environmental impacts of products and services"* and *"Environmental impacts of transporting products as well as employees"* (Ibid).

Additionally, they are using other environmental performance indicators, and the VPER explains that they tend to focus on measuring the most obvious things for particular areas. For example, for the area of printing they measure paper waste, for datacenters they look at the energy consumption, and for the area of Customer visit centres they look at the food service waste and plastic bottles. According to the VPER, Sun Microsystems is able to measure their progress by using specific measurements that are relevant to each task, which is helpful in their environmental work. It is stated that they tend not to use higher level indicators because they are less meaningful to the people doing the work. However they have one exception, which is CO_2. This since the measuring of CO_2 is a good way to compare the impact of

different activities as far as their GHG impact. The VPER clarifies that the electricity of a video conference can be compared with the impact of a rental car or a plane flight.

4.4 Costs and benefits of environmental work

4.4.1 Volvo IT

The Process Quality Manager (PQM) at Volvo IT explains that sometimes, there can be a conflict between financial and environmental objectives. One example is described with the idea of only serving organic food in the staff restaurant. The purpose with serving organic food is good, however it is more expensive than regular food and no one is really interested in paying extra for it (PQM). Overall, if higher costs are to be accepted, the environmental consideration has to bring other benefits and values. These other values are difficult to quantify (PQM). Furthermore costs are not seen as a major constraint for environmental work. Of course large campaigns, seminars and educations within environmental issues would require extra time and effort which would result in costs since time is money (PQM). However if environmental work is integrated within the rest of the business activities, the costs do not have to be that significant (Site Manager, SM). The Chief Executive Officer (CEO) believes that there might be a conflict in the short perspective, however not in the long run.

Financial objectives and environmental considerations definitely have a relationship both in a short and a long term perspective (PQM). However, in the short term you have to be tactical and focus on the areas that could generate obvious benefits, both financially and for the environment (PQM). These benefits are for example, travelling and energy consumption, since these efforts are easy for the company management to accept. The PQM explains that in a longer perspective the benefits and revenues are harder to quantify, however environmental work creates a profile and a positive company image with a great opportunity to generate profit in the long run.

The CEO exemplifies that electricity is expensive and he believes that politicians will increase taxes even more in order boost energy efficiency in the future. Therefore it has become more beneficial and motivating to work environmentally friendly. The PQM believes that positive financial effects for the businesses are an incentive for environmental work, especially on company management level. For the regular employees, the environment is probably a greater incentive than financial aspects. Furthermore, if only environmental issues were regarded without bringing any business benefits in some way, only a part of the management would meet you with approval (PQM). Management is evaluated in financial aspects and in a case where an investment is beneficial for the environment but negative for the finances, the financial objectives are chosen before environmental considerations (PQM & CEO). However, at large there is a relationship between the two, and there is a great opportunity for environmental efforts to benefit the finances of the company.

4.4.2 TeliaSonera

According to the CSR report (2006) TeliaSonera focuses on business activities with the most negative environmental impact and with the opportunity to reduce costs within their environmental work (www.teliasonera.se 6). The Quality & Environmental Manager (EM) declares that TeliaSonera does not see a conflict between environmental work and the rest of the business success. Neither do they see financial objectives as a constraint to work

environmentally friendly. At TeliaSonera, the relationship between environmental and financial objectives is more noticeable than the conflict and is thereby focused upon. The EM states an example that through increased automation, technicians does not have to be sent out as often to customers. This leads both to positive effects on the finances such as cost savings, as well as reduced environmental impact in line with their environmental objectives. Consequently, the constraint for environmental work according to the EM is not the financial part it is rather the lack of knowledge amongst employees concerning environmental issues.

Since the environmental work is integrated within the rest of the business activities it is not easy to measure the precise cost of environmental work, still some estimations can be done. According to the EM, ISO certification and external audit demand expenditures two times a year with approximately a cost of 30.000-35.000 SEK a time. However this is not a large expenditure compared to what is saved in travel expenditures every year, according to the EM. TeliaSonera has saved approximately 130 millions SEK in travel costs per year. However there are expenditures with environmental investments but the benefits are estimated to be much higher. Through their environmental work, TeliaSonera has reduced their travelling and energy costs significantly, as well as their CO_2 emissions. The EM also experiences that their company image has been improved through these efforts. Furthermore TeliaSonera has realized that you save both time and effort by decreasing travelling.

The EM sees no disadvantages with environmental work. Even if there would be disadvantages, she states that it is important for every organization to take their responsibility for their products and to inform customers how they can reduce their CO_2 emissions. The EM expresses that they feel fortunate to have a type of product that actually has a possibility to favour them financially as well as the environment at the same time. TeliaSonera states that their IT-product provides a solution with the possibility to substitute other activities with greater environmental impact, such as travelling. As said by the EM, IT-products have environmental impact as well, however the benefit of the IT-product is greater than the environmental impact. Therefore TeliaSonera's greatest profit is their product, not only in a business aspect but also in respect to the environment. According to the Annual report (2007) the net sales for the TeliaSonera Group was 91 billion SEK in 2006 and 96.3 billion SEK it 2007 (Ibid). In the CSR report (2006) TeliaSonera states that through their own environmental work and increased use of IT-products there are benefits for TeliaSonera, for example reduced overall costs by reduced travelling and decreased energy consumption (www.teliasonera.se 6).

4.4.3 Sun Microsystems

The Systems Practice Manager (SPM) explained that at present, environment is a major political issue, and no company can afford not to work environmentally friendly. The SPM reckons that there is a relationship between environmental goals and financial goals and that it is very rare that an environmental investment is not defendable in terms of finances. Seldom has an investment decision taken with regards to the environment had a negative impact on the finances of the company, since the payoff time of these investments often is very short. The Vice President of Eco Responsibility (VPER) clarifies that Sun Microsystems always makes a connection between financial and environmental goals. Moreover they state that they do the financial and environmental accounting hand-in-hand, their process does not let them conflict. He explains that there exist several projects that make sense for the environment and have a positive financial return on investment (ROI), so they prioritize those and ignore the ones that fail on one measure or the other.

One example when the relationship between the financial and environmental goals shows, according to the SPM, is when Sun Microsystems designs energy efficient products, demanded by the market. He believes that it will always turn out well for the business that listens to their customers as well as their surroundings, since they then will find a product to sell. It is stated that since environmental issues has become of great concern of Sun Microsystems' customers and themselves, that is the area in which the innovation has been centred. Furthermore innovation becomes something that generates revenues, when Sun Microsystems has skilful engineers who learn from Sun Microsystems' local problems as well as from discussing with Sun Microsystems' customers. Therefore, they can design products solving these problems. The SPM thinks that Sun Microsystems would sell less, if they did not provide energy efficient products. Another example showing that the two goals are inter-connected is when Sun Microsystems installed terminals in all the homes of the employees. The employees could now work from home, resulting in reduced office area needed, which in its turn lead to cost reductions in rent and energy use. Moreover the travels to the office decreased, and the firms overall environmental impact. The VPER clarifies that benefits of Sun Microsystems' environmental work are that they are lowering their operating expenses as a result of greening their datacenters and through their Open Work program. He further reckons that financial effects in terms of revenues are an incentive to work more environmentally friendly, as well as cost avoidance through efficiency.

The SPM explains that environmental work is inter-connected with costs as well, though it is rather a component in an investment calculation. For example, to install terminals in the homes of their work staff is connected with costs, but in fact the cost is now moved from the office rent account to the account for equipments. Moreover the terminal is cheap and the return on the investment is obtained quickly. The SPM continues by stating that he has never experienced that an environmental investment is not motivated from a financial perspective, rather the investments ideas have a positive environmental impact as well as financial return.

5. Analysis

In this chapter we will analyze the earlier given empirical findings and the frame of reference. We will also compare the organizations with each other. Our aim is to illustrate for Volvo IT how environmental work and especially how the use of environmental performance indicators can be carried out by analyzing TeliaSonera and Sun Microsystems.

5.1 Environmental work

Gartner states that two percent of the global CO_2 emissions come from the global information and communications technology, meaning that the IT-industry has environmental impact. We have understood after interviewing respondents at Volvo IT, TeliaSonera and Sun Microsystems that there are areas of prominent environmental impact. These areas mainly seem to be energy consumption of the IT-devices and the organizations' datacenters, material use and chemicals in the IT-devices, the travelling, both to work and business trips. Furthermore it has come to our knowledge that environmental work has not been as highly emphasized and communicated in Volvo IT, as in the other two organizations. However in both TeliaSonera and Sun Microsystems the environmental work is emphasized, which is illustrated in the rest of the analysis. Volvo IT is doing efforts resulting in less environmental impact as well, but it is not necessarily labelled environmental work. For example, the new water cooled datacenter in Arendal, as well as efficient IT-solutions.

According to Gartner as well as the report from WWF, the industry has positive impacts, in the sense that their solutions can contribute to an improved environment. Sun Microsystems for example has a focus on offering energy efficient products, Volvo IT's solutions help out in streamlining the logistics flow and TeliaSonera's products offers a substitute to travelling. Organizations view on environmental work has traditionally been to focus upon end of pipe waste and emission management, according to Bennett & James (1998). However we have seen that the major focus or aim within the three organizations is on environmental impact prevention as well as integrating the environmental objectives within the overall business objectives. Thereby the organizations do not have the traditional view of environmental work. For example, all of the three organizations are considering the lifecycle aspect both in purchasing, manufacturing, using equipment and when taking care of waste. We believe that integrating the environmental work is something that the companies are doing well, and especially TeliaSonera and Sun Microsystems. Bennett & James (1998), Membratu (2001) as well as Porter & Van der Linde (1995) emphasizes that an innovative, non traditional way to approach environmental work is usually more profitable than postponing it and taking care of it later. This can be seen at Sun Microsystems where innovation is included in their social responsibility strategy.

After studying both TeliaSonera and Sun Microsystems we have noticed that they have adopted Corporate Responsibility Strategy (CSR). CSR is about integrating the environmental and social aspects in the communication with stakeholders as well as within the corporations' business activities (www.ec.europa.eu). Our opinion is that training is a good way to integrate environmental work in the organization as it makes people aware of important issues. For example, TeliaSonera has integrated their environmental aspects in their operations and environmental education is a part of that integration. However we have understood that the view on environmental education and training differs. TeliaSonera emphasize training for their employees, and has put efforts in it since they believe that lack of knowledge is a constraint for environmental work. Volvo IT on the other hand believes that environmental

training requires extra time and efforts and only training would probably not be enough in order to become more considerate of environmental issues. Volvo IT Innovation Centre explains that encouragement and "learning by doing" is preferred instead of training. According to Merchant & Van der Stede (2007) control such as educating employees is a way to ensure that employees act in the best interest of the company. We believe that TeliaSonera sees long term benefits with environmental training and that it is a successful strategy which influences all the business activities in a positive manner.

According to Terrvik (2001) the growing interest of environmental issues within the society has forced companies to adapt to the new requirements. In our opinion, in all of the organizations, environmental work has arisen from some kind of stakeholder demand. For example in TeliaSonera Stakeholder pressure made them begin to certify their business according to ISO 14001 in 2001 and at Volvo IT the Volvo Group expects them to get certified. According to Ax et al. (2005) it has to be a balance between the goals of the organization and the opinions of stakeholders. Esty & Winston (2006) declare that building relationships and knowing your stakeholders will pay off. We agree with these statements and believe that stakeholders are important to pay attention to since they have significant influence on the success of the organization. This is confirmed by Sun Microsystems who believes that if customers are listened to and if their problems are solved, the business will turn out well, since the company then will find a product to sell.

5.2 Use of Environmental performance indicators

According to Merchant & Van der Stede (2007) employees will act in their own interest if there is no management control, which is not always in accordance within the organizations interest. Problems like motivational problems and lack of direction can be avoided by the use of control tools (Ibid). After doing our empirical study we have seen that both TeliaSonera and Sun Microsystems use management control in their environmental work. They have environmental targets to work towards and use indicators related to their targets. We have further noticed that environmental work has not been as actively controlled, through for example environmental performance indicators, within Volvo IT as in Sun Microsystems and TeliaSonera.

Environmental performance indicators are used as a tool to measure and control toward a more sustainable development and they reflect how efficiently energy and different materials are consumed in the organization (www.regeringen.se). By studying the work of both TeliaSonera and Sun Microsystems there is a strong indication that indicators are functional. This can be seen as both the organizations use indicators for the purpose of controlling and evaluating their environmental work as well as for measuring and setting targets. Further as said by Kolk (2000) the indicator provides useful information of how and to what extent the environmental objectives are met. There is a strong implication that the use of management control tools such as environmental performance indicators could be helpful in the environmental work. Therefore our opinion is that environmental performance indicators are something useful for Volvo IT to embrace. TeliaSonera verifies that indicators are functional in measuring and following environmental efforts, furthermore results get improved. Sun Microsystems also clarifies that by using specific measurements that are relevant to each task, they are able to measure their progress. For example, for the area of printing they measure paper waste and for datacenters they measure energy consumption. We believe that the follow up of indicators and efforts are important. Follow up is done in order to see if environmental objectives are met and how the is organization performing and in our opinion indicators would be useless without the follow up.

We believe that it is important that the indicators are chosen carefully which is confirmed by Winograd & Farrow as well as the report from SKL. In the frame of reference it is also underlined that all activities should not be measured. The SKL report state that the indicators should not be too many in numbers in order to get a good overview and they should also be easy to understand and to communicate. This is coherent with the opinion of Volvo IT who explains that it is important not to be overwhelmed by numbers and furthermore it is important that the indicators are applicable and measure the right things. In the frame of reference it is also described that the indicators also have to be adjusted to the individual organization, and to what is to be measured, for the indicators to be effective and useful (www.sou.gov.se). We would also like to stress the importance of not focusing on every activity in the organization. It is our opinion that it is more effective to have goals and indicators for specific areas and where it is important for the organizations to decrease their environmental impact. For example Sun Microsystems has goals and indicators for their GHG emissions as well as energy consumption. TeliaSonera uses more detailed environmental performance indicators mainly in the areas of energy use, the capacity of telecommunications network and travelling. Furthermore TeliaSonera state that the use of electricity is only measured in the locations where electricity meters are available. This is coherent with the view of Winograd & Farrow who described that the indicators should be accessible as well as not too expensive to collect. We agree on the fact that indicators should be easy and not too expensive to collect. If indicators are too difficult to collect they are not worth measuring since the costs will be greater than the benefits. Furthermore we believe that Volvo IT should start of on a small scale with a few indicators and measure important areas where it is desired to decrease costs as well as environmental impact.

The report from SKL state that for the indicators to be effective, the goals should be broken down into sub targets. This is our view as well and it is confirmed by TeliaSonera who believe that by breaking down goals and indicators, the activities of the staff will support the set objectives. For example TeliaSonera have indicators such as *"travel per employee"* and "*amount of telephone meeting a year per employee"*. Sun Microsystems explain that they tend to avoid higher level indicators but they have one exception; CO_2. Sun Microsystems finds that CO_2 is a good way to compare the GHG impact of different activities, for example the electricity of a video conference can be compared with the impact of a rental car or a plane flight. By interviewing respondents at TeliaSonera it has come to our knowledge that they have been measuring travelling and other areas since 2001 in order to follow their progresses within the environmental work. They believe that by using indicators, everyone in the organization will pay attention to the right things. As an example, when attention was given to the area of travelling and virtual meetings within TeliaSonera, the transport and travelling decreased with 40 percent between 2001 and 2007 and the use of virtual meetings increased. Furthermore the air travel within the company was reduced with about 56 percent. This is coherent with the statement in Merchant & Van der Stede (2007) "*what you measure is what you get"* as well as the statement in the report from SKL "*what gets measured gets managed"*. Furthermore TeliaSonera believes that it is thanks to their energy index and efforts in reducing electricity use, that improvements have been reached. For example the overall energy use within TeliaSonera has decreased with approximately 30 percent since 2001. They also have a target such as reaching energy efficiency for at least 3 percent, attached to the energy index. At Sun Microsystems, goals and measurements to reduce energy consumption has also been put into practice, for example they have spotted a range of projects in order to reduce their energy costs with four percent per year. When starting this thesis we were of the understanding that performance indicators could help to focus on the right activities and

efforts. By studying TeliaSonera as well as Sun Microsystems this has now been confirmed. There is a strong implication that environmental performance indicators have a great potential in helping the organizations to control efforts and reaching their goals, as well as providing an opportunity to integrate environmental work in the organization.

As mentioned earlier it has come to our knowledge that Volvo IT is not using any environmental performance indicators. However they believe that indicators can be helpful in their environmental work and believes that the use of environmental performance indicators will raise awareness. This is something that we definitely agree with and it is also confirmed by the reports from SKL and SOU. The reports explain that an important purpose of environmental performance indicators is to put focus upon and create awareness as well as knowledge of environmental issues within the organization. We have understood that both TeliaSonera as well as Sun Microsystems create awareness when communicating their efforts and their target achievements at their website as well as in CSR and annual reports. Volvo IT on the contrary does not seem to communicate their efforts. However we believe that communication could be a good approach for Volvo IT since communication has an opportunity to create an understanding and knowledge about environmental issues within the organization as well as amongst stakeholders. For example through communication it is easier for employees to know what to strive for.

By reading the report from SKL we have also realized that environmental performance indicators have an ability to make information more accessible. We believe that this is an important characteristic of the indicators which in turn helps organizations in their decision making, planning and discussions within their environmental work. It has come to our knowledge that the use of environmental performance indicators is in common practice within the municipalities. The municipalities often present indicators in their annual report which is a way to communicate the result and progress to their stakeholders as well as to compare their efforts with each other. Sun Microsystems explains that the GRI reporting is useful in dialogue with their customers. Reporting according to the GRI guidelines is something that both TeliaSonera and Sun Microsystems do which is in line with their CSR work. The guidelines also make it easier to compare between organizations. Comparing and being able to benchmark the organizations environmental performance is something that we believe could create incentives to improve efforts within this area.

5.3 Costs and benefits of environmental work

According to Ax et al. (2005) the main purpose in an organization is to achieve and consistently work towards financial as well as non-financial goals. As said by Ax et al. (2005), and what our study has given an indication of, is that non-financial goals such as environmental objectives have the potential to generate positive financial effects. Overall TeliaSonera and Sun Microsystems together with Volvo IT seem to agree that there is a positive relation between financial and environmental objectives. However we have noticed that there would probably not be as great focus on environmental work in the three organizations if finances were perceived as a constraint to work environmentally friendly. By doing this study we have understood that at Volvo IT's financial objectives are chosen before environmental considerations in a case when there is a conflict in-between. This conforms to Ax et al. (2005) who state that to be profitable is one of the main targets in almost every organization and sub targets, such as environmental targets, should not conflict with the main target.

It has come to our knowledge that both TeliaSonera and Sun Microsystems experience that the financial and environmental goals are related. For example in Sun Microsystems, financial and environmental accounting is done hand-in-hand, meaning that they do not let the two goals conflict. According to Sun Microsystems there are plenty of projects that make sense for the environment and have a positive financial return on investment (ROI) and these investments are prioritized. Other investments that fail on one measure or the other are ignored. We have understood that Sun Microsystems implement the investments that benefit both the finances as well as the environment. Therefore it may seem that Sun Microsystems do not prioritize finances and are excluding environmental projects that could be more beneficial for the environment.

As explained by Bennett & James (1998), there is a greater opportunity to get support and back-up for environmental investments if a positive financial effect for the business is highlighted. TeliaSonera states that they focus upon business activities with the most negative environmental impact and with the opportunity to reduce costs. Furthermore they state that they provide a service that actually has a possibility to favour the environment and themselves financially at the same time. For example their products such as broadband and telephone can substitute travelling. Volvo IT does not see costs as a major constraint either. However their opinion is that there can exist environmental activities that are expensive, such as time consuming seminars and educations for employees. We have recognized that efforts that are more expensive are not focused upon to the same extent. When we begun this thesis we were of the understanding that environmental goals could conflict with financial goals and therefore be a constraint for environmental work. However if investments and environmental efforts are carefully chosen, as can be seen in the examples with TeliaSonera and Sun Microsystems, a conflict does not necessarily have to exist. There are investments which can satisfy both the environment and the finances of the company, and these are chosen before others. One example at Sun Microsystems is when terminals were installed in the homes of the employees. When employees are able to work from home less office area is needed which leads to cost reductions in rent and energy use.

Both TeliaSonera and Sun Microsystems integrate their environmental work within the rest of the business activities. As explained earlier, we have seen this through their adoption of CSR, the training of the employees in environmental issues and through the use of environmental performance indicators. Bennett & James (1998) state that if environmental work is integrated within the rest of the business activities, costs for environmental work is harder to quantify. This appears to be to be the case in TeliaSonera who believes that when integrating environmental work the costs are more difficult to estimate. On the other hand Bennett & James declares that if environmental work are integrated within the rest of the business objectives the extra expenditures does not have to be that great. TeliaSonera gives the impression that they are aware of this. For example, in the case when older equipment demanding a large amount of energy is substituted for newer energy efficient equipment. The cost of the new equipment is paid off through reduced energy costs, thereby the investment has not a negative impact in the finances in the long run. We believe that the strategy of integrating environmental work seems like a good approach since large expenditures can be avoided and cost savings can be attained.

Our study has shown that the ISO 14001 certification is a cost related to environmental work, easy to identify. We are aware of that the ISO certification expenditure does not necessarily stand for the largest cost of environmental work. However we believe the ISO expenditure is easier to detect than other environmental costs that are integrated in the business operations.

According to Kolk (2000) an external audit is required periodically when certified according to ISO 14001. Since certification require companies to employ consultants to audit their work, resulting in expenditures, Volvo IT would only consider certifying their various departments if the customers demand it. TeliaSonera on the other hand believes that it is a minor expenditure. Although opinions about certification differ, in our opinion certification is a necessary expenditure when customers demand it, not being certified could lead to damaged company image and they could loose customers.

Porter & van der Linde (1995) declare that there are opportunities in decreasing costs related to environmental work and that much more can be done, something that all of the three organizations appears to be aware of. Energy consumption and travelling have significant environmental impact and generate high costs within all of the three IT-companies and we have noticed that these areas are focused upon the most. The areas of energy and travelling are probably the areas where most progress is possible and where there is a great opportunity to reduce costs as well. Bennett & James (1998) confirm that through a more efficient use of both energy and materials, costs and environmental impact can be reduced significantly. As can be seen in TeliaSonera older energy-demanding equipment is substituted and Sun Microsystems provides energy efficient products.

Furthermore there are different environmental regulations. In our opinion, organizations have to adapt to these stricter environmental regulations. Bennett & James (1998) declare that environmental regulations will become stricter and therefore adjustments have to be done. This is confirmed in Volvo IT who believes that for example taxes for energy will increase, and therefore it is necessary to decrease the energy consumption. Electricity is expensive and we believe that high costs are a good incentive for an organization to decrease energy consumption as well as their environmental impact. This is confirmed by Sun Microsystems who state that financial effects such as cost reductions through efficiency are an incentive to work more environmentally friendly. However we believe that the companies would not reduce energy consumption if it is not cost efficient. It seems like the organizations are motivated to implement environmental policies and investments, because it can lead to reduced costs. Therefore, in our opinion, companies would not participate in environmental work if it is not financially beneficial for them.

As Bennett & James (1998) state environmental work is often mentioned in terms of cost reduction. There is a strong indication that cost reduction, through for example increased efficiency, and as mentioned earlier reduced travelling and energy use, is a major benefit of environmental work within the three organizations. Cost reduction also seems to be the most noticeable benefit as well. However our study has given an indication that cost reductions are not the only benefit with environmental work and that there is a great potential for organizations to profit by working environmentally friendly. Esty & Winston (2006) states that benefits such as fresh thinking, innovative culture and competitive advantage are interconnected with environmental work. This can be seen at Sun Microsystems where innovation is a part of their CSR strategy. Moreover, innovation with environmental considerations in focus has become something that generates revenues. Bennett & James (1998) clarify that businesses that provide products with "green" attributes have a great opportunity to generate revenues as well. By studying three IT-companies we have understood that the IT-industry supply products and solutions with the opportunity to generate a great benefit for their costumers, for example through reduced environmental impact. The three organizations agree that their solutions to customers are their greatest profit and contribution concerning an improved environment. Furthermore it cannot be denied that

providing a product with environmental attributes have the opportunity to generate pay-off through competitive advantage. Sun Microsystems for example are providing "eco responsible" energy efficient products, and some of their products meet the energy efficiency criteria of the logo "*energy star*". This is an efficient way to compete and to profit within the environmental work according to the third Orsato & Renato (2006) competitive advantage strategy "Eco Branding".

The second strategy "Beyond Compliance Leadership" (Orsato & Renato 2006) states that benefits and competitive advantage can be reached by promotion of environmental work, which in our opinion corresponds to the way TeliaSonera and Sun Microsystems act. We have seen that TeliaSonera as well as Sun Microsystems apply transparency to the environmental challenge. Furthermore we have noticed that they communicate their environmental performance and progresses to its stakeholders, for example through their websites and CSR and Annual reports. As mentioned earlier Volvo IT has not come as far as TeliaSonera and Sun Microsystems in communicating their environmental efforts and it is not as easy to obtain information about their environmental work. Furthermore Volvo IT does not label their efforts as "environmental work". In our opinion communication of "environmental work" can improve the company image and Volvo IT could gain from doing so, even though it is not the only way to reach pay-off.

Bennett & James (1998) state that in the long run environmental work can bring intangible benefits and values, such as improved company image and a more attractive working place. Bennett & James (1998) continue by stating that these profits and benefits of environmental work are not always easy to estimate. Volvo IT also believes that these other values are difficult to quantify. TeliaSonera confirms that through consistently working for reduced environmental impact their company image is improved. Sun Microsystems further states that no company can afford not to be considerate of the environment in the future and Volvo IT agrees by saying that environmental considerations have become a prerequisite for survival. As said earlier, all benefits with environmental work are not easy to quantify. However we believe that it is important to work with these issues since stakeholders are more aware of and demands environmentally friendly products. With the examples above we believe that it is beneficial for every organization to incorporate environmental work into their daily operations.

6. Conclusion

In this chapter conclusions and recommendations based on our frame of reference and empirical studies will be presented. Since only three organizations have been studied, the conclusion cannot be generalized. At last, suggestions for further studies are presented.

Our aim with this study has been to illustrate for Volvo IT how the use of environmental performance indicators can help in the environmental work, and to show the financial effects of environmental work in the IT-industry. Through our study it has come to our knowledge that Volvo IT is doing environmental efforts, however it is not clearly labelled environmental work. Examples are, efficient IT-solutions that streamline the logistic flow, resulting in less transports needed which in turns lead to monetary savings as well as environmental benefits for their users. Moreover their newly built datacenter where water is used to cool the facility is an example where environmental issues have been considered.

TeliaSonera as well as Sun Microsystems use environmental performance indicators, however Volvo IT does not. By studying TeliaSonera and Sun Microsystems as well as reading the literature, we have realized that *"what gets measured gets managed"* as the indicators make management and employees to focus upon the right activities. Furthermore we can conclude after reading the report from SKL, as well as studying TeliaSonera and Sun Microsystems that goals should be broken down into sub targets. In order for the indicators to be effective it is also important to avoid indicators of a higher level, in this way there is a greater opportunity for the actions of the employees to support the set objectives. TeliaSonera for example uses *"travel per employee"* and "*amount of telephone meeting a year per employee*". However Sun Microsystems has one exception, which is CO_2. CO_2 measuring is a way to compare GHG impact of different activities, for example the electricity of a video conference can be compared with the impact of a rental car or a plane flight. An environmental performance indicator show how goals are met and is also effective in communicating information to employees and other stakeholders of what is important and focused upon. This is successfully done in both TeliaSonera and Sun Microsystems. For example at TeliaSonera, travelling has been in focus since 2001. They started to measure the *"amount of air travel per year"* and up to 2007 the travels were reduced with approximately 56 percent. Virtual meetings in some kind have made it possible to reduce travelling and transporting on the whole with approximately 40 between 2001 and 2007.

There is a strong indication that an environmental performance indicator is a useful tool in measuring efforts and following progresses. Thereby it is a helpful tool to control that environmental goals are being reached. Consequently, using environmental performance indicators could be a useful approach for Volvo IT, since there could be a better control as well as communication concerning the environmental work.

The three organizations agree that there is a relation between environmental and financial goals. In Sun Microsystems this can be seen as they do their financial and environmental accounting hand-in-hand, which means that they do not let the two goals conflict. Even though there can exist investments which have positive environmental impact but are costly, we have noticed that there are investments that satisfy both measures, and these are chosen before others. By studying TeliaSonera and Sun Microsystems, we have noticed that they seem to be tactical when implementing investments that are beneficial both for the finances

and the environment. Though, in our opinion, companies would not participate in environmental work if it is not financially beneficial for them. Sun Microsystems state that there are plenty of projects that make sense for the environment and have a positive financial return and that these investments are prioritized. Investments that fail on one measure or the other are de-prioritized. Furthermore TeliaSonera focus on business activities with significant environmental impact and where the opportunity to reduce costs is prominent, for example in the area of travelling and energy consumption. We can conclude that environmental work could lead to positive financial effects for the businesses, but that it would depend on the type of investment chosen.

We can further conclude that the most apparent positive financial effect is achieved by reducing costs. Decreased energy consumption and decreased travelling, are two examples of cost reductions, these are easy to identify as well as quantify. In the IT-industry the environmental goals can be easily integrated in the financial objectives since cutting costs often involve decreased environmental impact. For example by focusing on reduced business travelling, both the environment and finances are favoured. Same thing when the area of energy consumption is highlighted. When energy consumption decreases, costs are reduced and the environmental impact lowered. Intangible benefits of environmental work exist as well, but are not always as easily quantified. As an example, improved company image is difficult to measure, even though it can generate pay off in the long run. Another benefit of environmental work is generated by the IT-solutions of Volvo IT, TeliaSonera and Sun Microsystems. To provide products with an environmentally friendly feature generates benefits in terms of revenues as there is a growing demand for these products on the market. This is the case with Sun Microsystems' through innovation offer energy efficient products, for example monitors and workstations meeting the criteria of *"energy star"*. Since electricity use is a large expenditure for Sun Microsystems as well as for their customers, their products are demanded and revenues are generated. There is a strong indication that a growing interest for environmental issues amongst stakeholders makes it challenging for companies to neglect environmental work. Our final conclusion is that it is beneficial for every organization to incorporate environmental work into their daily operations.

6.1 Recommendations for Volvo IT

Our recommendation for Volvo IT is to use environmental performance indicators in order to reach environmental objectives and to measure the areas in need of improvement and of great interest. For example the areas which have major environmental impact as well as have high costs.

- *Start of on a small scale, with a few indictors*: Winograd & Farrow (EOLSS) as well as the report from SKL underline that the indicators have to be carefully chosen, all the activities should not be measured since *"what you measure is what you get"*. The SKL report also explains that the indicators should not be too many in numbers in order to get an overview.
- *To focus on the most obvious, relevant and easy to measure within particular areas*: For example Sun Microsystems measures paper waste within the printing area and energy consumption for the area of datacenters. In the area of energy, TeliaSonera measures the use and capacity for their networks. Winograd & Farrow (EOLSS) also state that the indicators should be accessible as well as not too expensive to collect. For example at TeliaSonera the use of electricity is calculated for in every location where electricity meters are available.

- *Break down the environmental objectives to sub targets*: The report from SKL as well as TeliaSonera and Sun Microsystems explain that it is important that environmental objectives are broken down, and further to have indicators on a lower level. TeliaSonera for example uses *"travel per employee" and "amount of telephone meetings a year per employee"*.
- *Set targets to the indicators and follow up efforts*: For example at TeliaSonera, a target such as reaching energy efficiency for at least 3 percent, are attached to their energy index. In the area of overall energy use, measurements have been followed resulting in a progress. A reduction with approximately 30 percent has been reached since 2001.
- *Communicate environmental efforts to improve company image*: TeliaSonera as well as Sun Microsystems apply transparency to the environmental challenge and create awareness when communicating their efforts and their target achievements. They communicate to stakeholders, both at their website and in reports such as CSR and annual reports as well as seminars.

6.2 Suggestion for further studies

We have studied organizations within the IT-industry. Our suggestion for further studies is therefore to look at organizations in other types of businesses, such as a more traditional manufacturing organization. This would be interesting both from an environmental performance indicator point of view, as well as how financial effects are experienced.

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8. Appendix

Interview guide

Personal
1. What is your position in the company and background

Environmental work
2. How did the environmental work start and why?
3. How does the company work environmentally friendly?
4. Does the company have any environmental strategies and goals?
5. Is the company certified according to any environmental management standards?
6. Does the company have any demands on suppliers?
7. What part of your business operations has the most prominent environmental impact?
8. Do you have any environmental training programs?
9. What are the pros and cons of environmental work?

Control
10. Does the company have any environmental performance indicators in practice?
If no;
11. Do you think that the use of environmental performance indicators could be beneficial for your company? and how?
If yes;
12. How is the use of environmental performance indicators beneficial for the company's environmental work?
13. Can you give examples of important areas where the indicators are in practice?
14. Can you give example of environmental performance indicators that are in practice?
15. Are the indicators different for different levels in the company?
16. Are there (sub) targets attached to the indicators?
17. How do the indicators help in controlling towards reaching environmental objectives?
18. Are the indicators followed and how?
19. Do you have any index in use?

Financial
20. Do you see a conflict between environmental and financial goals, and how?
21. Do you see a relationship between environmental and financial goals, and how?
22. What costs do you see related to environmental work?
23. What benefits do you see related to environmental work?
24. Do you see any cost reductions related to environmental work?
25. Is the finances, such as high costs and expenditures a constraint for working environmentally friendly?
26. Are positive financial effects an incentive to work environmentally friendly?

Other
27. How do think environmental work will develop within the organization in the future?

Is there something else you would like to add?
Is it possible for us to get back to you if we have any further questions?