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ENVIROMENTAL BENCHMARKING

A TOOL FOR CONTINUOUS ENVIRONMENTAL IMPROVEMENTS IN THE SME SECTOR

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Title:

Enviromental Benchmarking

A Tool for Continuous Environmental Improvements in the SME Sector

Abstract:

The aim of the project was to gather information on existing versions of environmental benchmarking tools for small and medium sized enterprises (SMEs) in the Nordic countries. Special consideration is given to:

- The interrelation between environmental benchmarking and well-known environmental tools such as Life Cycle Assessment (LCA), Green Accounting, Environmental Management Systems (EMS) and Eco-labels
- Available benchmarking methodologies
- Generic tools
- Sector-specific tools relevant for Nordic industries. The sectors analyzed include fisheries, tourism and packaging

Furthermore, the intention was to understand how to acclimatize or construct an environmental benchmarking system for small and medium sized Nordic enterprises. The main results are:

- Environmental benchmarking is an emerging tool for environmental work.
- No Scandinavian environmental benchmarking systems were found. Relations of Scandinavian eco-labels and EMS were discussed.
- A handful of environmental benchmarking tools were found worldwide, both generic and sector specific tools.
- A large number of the specific tools found pertain to the tourism sector.

An MS research was launched in conjunction with this work. The research question of the work was "Is environmental benchmarking a viable methodology for small and medium sized enterprises in the Nordic tourism industry?" The answer was that benchmarking of environmental performance can be a powerful tool in improving environmental performance of SMEs and that use of this methodology should be encouraged (Sparf, 2005).

This project also proposes a framework for an environmental benchmarking tool. The tool:

- Is based on available scientific knowledge, such as LCA to choose the key indicators.
- Is supported by Green accounting to collect key figures.
- Identifies deviations from good practice – by comparison, environmental benchmarking.
- Cooperates with eco-labels and EMS systems.

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Definitions

Benchmarking: A business methodology to analyze and understand a company's existing activities and practices, to identify best practices and compare them to one's own business

Best Practice/Best-in-class: Processes, functions, operations or organization's that represent the highest level of performance.

Competitive advantage: Refers to a company's ability to compete in the market. Companies must have a business strategy that gives them some advantage over their competitors, based on either cost or quality leadership.

Continuous improvement: A systematic process of improving a process, function, operation or the entire organization.

Eco-label: Type I label compares products within the same category, awarding labels to those that are environmentally preferable through their whole life cycle.

Environmental aspect: Any element of an organization or its activities or products that has the potential to interact positively or negatively with the environment.

Environmental benchmarking: Benchmarking of environmental performance for continuous improvement.

Environmental impact: The change that takes place in the environment as a consequence of an organization's environmental aspects.

Environmental indicators: Key figures relating to activities, collected at regular intervals for environmental management purposes.

Environmental management system (EMS): A system for addressing the environmental policies, objectives, procedures, principles, authority, responsibility, accountability, and implementation of an organization's means for managing its environmental affairs.

Environmental performance: How well a company is doing from an environmental point of view, in other words, the level of environmental impact caused by activities?

Environmental Product Declaration: Type III label, based on an independent LCA.

Green Accounting: Natural resource accounting. The prototype is financial accounting.

Life-Cycle Assessment (LCA): An analysis on environmental impacts of the product, from raw material extraction, through materials processing, use and disposal at the end of the product's life (from "cradle to grave").

Small and medium-sized enterprise (SME): Businesses with fewer than 250 employees.

Contents

Summary

The aim of the project was to gather information on existing versions of environmental benchmarking tools for small and medium sized enterprises (SMEs) in the Nordic countries. Special consideration is given to:

- The interrelation between environmental benchmarking and well-known environmental tools such as Life Cycle Assessment (LCA), Green Accounting, Environmental Management Systems (EMS) and Eco-labels
- Available benchmarking methodologies:
- Generic tools
- Sector-specific tools relevant for Nordic industries. The sectors analyzed include fisheries, tourism and packaging.

Furthermore, the intention was to understand how to acclimatize or construct an environmental benchmarking system for small and medium-sized Nordic enterprises. The main results are:

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- No Scandinavian environmental benchmarking systems were found. Relations of Scandinavian eco-labels and EMS were discussed.
- A handful of environmental benchmarking tools were found worldwide, both generic and sector specific tools.
- A large number of the specific tools found pertain to the tourism sector.

An MS research was launched in conjunction with this work. The research question of the work was “Is environmental benchmarking a viable methodology for small and medium sized enterprises in the Nordic tourism industry?” The answer was that benchmarking of environmental performance can be a powerful tool in improving environmental performance of SMEs and that use of this methodology should be encouraged (Sparf, 2005).

This project also proposes a framework for an environmental benchmarking tool. The tool:

- Is based on available scientific knowledge, such as LCA to choose the key indicators.
- Is supported by Green accounting to collect key figures.
- Identifies deviations from good practice – by comparison, environmental benchmarking.
- Cooperates with eco-labels and EMS systems.

The project was funded by Nordtest and was incorporated with Nordtest into Nordic Innovation Centre (NICE).

1 Introduction

Environmental affairs have been gaining momentum in the last few decades with increasing commitment in the business sector, among local authorities and governments. The trend has led to the development and usage of various environmental and quality management tools, eco-labels and standards.

Environmental benchmarking is an emerging tool, to achieve continuous improvement by a **gap analysis**, followed by action to breach that gap. Environmental benchmarking is aimed at improving both business and environmental performance simultaneously.

Performance environmental benchmarking helps to find the environmental impact of a business over time, based on use of (and costs for) important environmental aspects such as energy, chemicals and production of waste. Furthermore, it compares this impact with similar businesses, and gives indications of areas of improvements.

The purpose of this study is to provide information on existing versions of environmental benchmarking tools and to point out simple systems for small and medium sized enterprises in the Nordic countries. This is performed in order to realise any further work of acclimatisation or construction of an environmental benchmarking system for small and medium sized Nordic enterprises.

Special consideration was given to:

- Interrelations between environmental benchmarking and well-known environmental tools like LCA, Green Accounting, EMS systems and Eco-labels.
- Available benchmarking systems relevant for three Nordic industries. The sectors include fisheries, tourism and packaging.

Discussions are provided on how environmental benchmarking may evolve along with other useful environmental tools. Recommendations are given on development of such a tool for Nordic SMEs.

2 SMEs and the environment

SMEs play an important role in the economy of the Nordic countries as well as worldwide. Approximately 99% of all Nordic enterprises are SMEs, and some 30–70% of the total workforce is employed by SMEs (European Community 2003, StatBank, 2004).

Although their individual contribution to environmental impacts is typically small, SMEs as a whole have significant effects. Their exact proportion of the total environmental impacts is not known, but figures between 50% and 70% are often mentioned (Berends et al., 2000, Hillary, 2000).

SMEs are by definition small (with fewer than 250 employees) and have limited resources; whether financial, workforce or knowledge (Modahl & Thorensen, 2002). They usually find it difficult to identify their environmental aspects and measure their environmental impacts (Fanshawe, 2000). In addition, they seem to have little knowledge on environmental management tools (Hillary, 2000). Furthermore, they do not always sense the benefits of environmental improvements and lack confidence, information and data to do so. The bottom line is that relatively few SMEs have introduced practices to improve their environmental performance (Gerstenfeld & Roberts, 2000).

One can thus draw the conclusion that environmental management tools for SMEs should:

- Be inexpensive to acquire and apply
- Be simple and easy to use
- Guide and motivate the user
- Result in economic benefits
- Lead to improved environmental performance

3 Benchmarking – concepts and definitions

Benchmarking is a business tool that has been used since the 1970's. On the other hand, environmental benchmarking is a relatively recent phenomenon, but in order to understand its possibilities one must first grasp what benchmarking is all about.

3.1 Benchmarking as a business tool

The concept of benchmarking was pioneered by the Xerox Corporation to meet the Japanese competitive challenge of the 1970's. A 1976 **definition of benchmarking** says that it is "*the study of a competitor's product or business practices in order to improve the performance of one's own company*". The American Productivity and Quality Center defines benchmarking as follows: "*Benchmarking is the practice of being humble enough to admit that someone else is better at something, and being wise enough to learn how to match and even surpass them at it*".

In short, benchmarking is:

- A structured learning process with the goal of continuous improvement and gaining competitive advantage by finding better ways to serve customers or by achieving cost savings, and ultimately increasing profitability and value to stakeholders
- A tool to analyze and understand a company's existing activities and practices, to identify best practices and compare them to one's own business, and finally to set goals of improvement based on the benchmark (McNair & Leibfried, 1992).

Romano (2005) refers to benchmarking as an honest assessment. Benchmarking can help a company to identify opportunities for improvements. Regular benchmarking ensures that a company stays at the peak of development and is not in danger of being left behind by competitors (McNair & Leibfried, 1992).

The American Productivity and Quality Center (2004) has summarized some of the possible **benefits of benchmarking**:

- Improving profits and effectiveness
- Accelerating and managing change
- Achieving breakthroughs and innovations
- Making better-informed decisions

3.2 Types of benchmarking

Typically, the **focus of benchmarking** is on one of the following (Jackson, 1999; McNair & Leibfried, 1992):

- **Roles:** Who does what in a company?
- **Strategic issues:** Why something is done? What should we be doing?
- **Processes:** How something is done? How do others do it?
- **Performance:** How well should we be doing it?

Benchmarking of roles refers to either persons or functions within an organization. When focusing on roles, a company analyzes tasks, responsibilities and personnel structures, to find out whether some of these could be improved by investigating how other companies manage different roles. Alternately, benchmarking of strategic issues deals with the "big picture", that is finding solutions in accordance with what the company is doing and why and whether the emphasis is on the right things at the right time. Focusing on processes can also be useful. This type of benchmarking aims to answer the question of how something is done, and whether there exists a better way of doing it or if there is a better technology available. The focus is on specific processes within the company, such as how a product is manufactured or how a service is produced. Finally, benchmarking of performance refers to measuring one's performance by key figures and comparing them to those of others in order to identify gaps in performance (Jackson, 1999; McNair & Leibfried, 1992).

Benchmarking is also divided into several types according to **whom one benchmarks against**. McNair and Leibfried (1992) discuss the following four types of benchmarking:

- **Internal:** Comparison between departments or sites within company
- **Competitive:** Comparison with direct competitors
- **Industry/Functional:** Analyzing trends within the industry
- **Best-in-Class:** Analysis of multiple industries to find best practices

Internal benchmarking is useful to identify issues within the organization that are in need of evaluation and improvement and to keep track of changes within time. This type of analysis compares functions within a company or between departments or sites, for example could different trawlers within a fishing company share their knowledge on important environmental aspects.

Competitive benchmarking is the basic type of external benchmarking concentrating on direct competitors. Knowing the strengths and weaknesses of competitors is vital for continuous success.

Industry/Functional benchmarking refers to analyzing trends within an industry. The objective of this type of benchmarking is to look at what the industry is doing and to find trends.

Best-in-Class/Generic benchmarking refers to learning from best practice. In this type of benchmarking, a company searches for innovative solutions from those who are best at that specific activity. A fishing company could for instance look into the practices of a bank when wanting to improve their financial department. Comparison across industry boundaries can give innovative and successful results. Table 1 summarizes the different types of benchmarking and furthermore gives an idea on which types of combinations of benchmarking give the best results.

Table 1: The relevance and value of different types of benchmarking

	Internal	**Competitor**	**Industry/ Functional**	**Best-in-class /Generic**
Roles benchmarking	Little capacity for improvements	Valid comparisons can be made	Learning from the best in industry	Learning from those who are best in managing personnel
Strategic benchmarking	Little capacity for improvements	Best way to get ideas for strategies and planning	Limited value due to differences in business ideas	Limited value due to differences in business ideas
Process benchmarking	Good place to start, but limited usefulness	Legal limitations usually prevent this type of benchmarking	Good capacity to provide innovative solutions	Best way to successful innovations
Performance benchmarking	Important, but does not show what is possible	Comparison of performance indicators	Limited comparability between sectors	Comparisons of indicators not possible

Low **Medium** **High relevance and/or value**

Source: Sparf (2005), adapted from Anderson and Pettersen (1996) and Bolli and Emtairah (2001)

4 Environmental benchmarking principles and approaches

Environmental benchmarking is the act of benchmarking environmental matters within a company. A decade ago, the process of benchmarking for environmental purposes was typically an exercise in futility (Sarkis, 2003). The sources of benchmarking data from both internal and external sources were virtually non-existent. Organizations neither kept the necessary records nor were willing to share them for many reasons, including potential liabilities associated with environmental performance (Sarkis, 2003). This is however changing and possibilities for environmental benchmarking are steadily increasing due to legislative requirements and principles of sustainability. No standard is available for environmental benchmarking (e-mail 04.07.05 from Vilardell, T.B. CEN).

4.1 Defining environmental benchmarking

The European Environmental Benchmarking Network (EEBN) refers to environmental benchmarking as an environmental management tool. According to EEBN, it can provide a substantial contribution to the improvement of environmental performance by facilitating the **identification of the gap between company performance and a given performance** (2000). Typically, environmental benchmarking requires a holistic approach, as the environmental aspects of a company can occur in any department or activity (Økstad et al., 2001). Other definitions of environmental benchmarking include:

- Environmental benchmarking involves finding out how "best-in-class" organizations achieve high performances … and … trying to adapt these superior practices to their own organizations (Bolli & Emtairah, 2001, p. 12).
- Environmental benchmarking is a structured approach to rigorously examine and compare, from an environmental perspective, the processes supporting different business activities. The objective of environmental benchmarking is to identify and assess the abilities and attitudes a company must have to excel in business and environmental performance simultaneously (Szekely et al., 1996, p. 23).

4.2 The process of benchmarking

Jackson (1999) has identified six questions that describe the process of benchmarking adequately:

1. How are we going to benchmark?
2. Who are we going to benchmark against?
3. How will we get the information?
4. How will we analyze the information?
5. How will we use the information?

These questions emphasize the importance of making a plan for the benchmarking process, instead of just barging ahead. Before starting, the company/organization must ask why it is going through the process and decide what type of benchmarking is most appropriate (role/strategic/process or performance benchmarking). Management should set clear goals for the process and determine who will be doing what.

According to The Leading Educational Website for Business Students (www.tutor2u.net Retrieved, June, 2005) application of benchmarking involves four key steps:

- Understand in detail existing business processes
- Analyse the business processes of others
- Compare own business performance with that of others analysed
- Implement the steps necessary to close the performance gap.

And Matthews (2003) noted that benchmarking and EMS both follow the same general four-step plan, namely "plan, do, check, act" (Cascio, 1996; Marcus & Willig, 1997; Wilson, 1998; Woodside et al. 1998).

1. **PLAN:** Situation analysis
2. **DO:** Collection of comparison data
3. **CHECK:** Identification of the performance gap
4. **ACT:** Performance improvement

The first step requires outlining of the current situation within the company followed by the benchmark, i.e. finding out what the others are doing. Comparison with other companies helps a company to identify the performance gap, in other words: "This is where we are, and this is where others stand". Finally, in order to benefit from the benchmarking results, a company should develop an action plan to improve their own performance in order to close the gap. This approach should be adequate for SME use.

4.3 The scope and types of environmental benchmarking

Environmental benchmarking can also involve the following types of benchmarking (Table 1, page 5), benchmarking of roles, strategic issues, processes and performance. Environmental benchmarking can thus either involve the use of clear key figures such as the energy used per item produced or non-quantified comparisons to learn best practices and suggest issues to benefit from (Wilson & Sasseville, 1999). Table 2 presents the several different issues that can benefit from benchmarking in relation to the focus and type of comparison possible.

Table 2: What issues/subjects can benefit from environmental benchmarking?

Focus of benchmarking (See Table 1)	**Issues to undergo environmental benchmarking**	**Type of benchmarking** (See Table 1)
Roles: Who does what and when?	▪ Environmental management responsibilities and tasks	▪ Competitor ▪ Industry/Functional ▪ Best-in-class/Generic
Strategic issues: Why are things done?	▪ Environmental policy	▪ Competitor ▪ Industry/Functional ▪ Best-in-class
Processes: How are things done? How is information collected?	▪ Environmental education and training ▪ Product development ▪ Environmental data management systems ▪ Environmental/Green accounting ▪ Energy management ▪ Waste minimization and recycling ▪ Emergency response systems ▪ Environmental auditing ▪ Environmental management systems (EMS) ▪ Environmental reporting ▪ Emissions monitoring ▪ Environmental indicators ▪ Life Cycle Assessment (LCA)	▪ Industry/Functional ▪ Best-in-class/Generic
Performance: How well should we be doing it?	▪ Environmental legislation ▪ Eco-label criteria ▪ Comparing key figures/indicators ▪ Comparing figures from Ecobalances ▪ Comparing figures from Environmental/Green accounting	▪ Internal ▪ Competitor ▪ Industry/Functional

Sources: Sparf (2005), Wilson & Sasseville (1999) and Bolli &Emtairah (2001)

As Table 2 shows, there is a range of issues where companies can benchmark. Most environmental benchmarking systems focus on benchmarking environmental performance. In fact many authors only consider performance benchmarking (benchmarking of indicators) when discussing environmental benchmarking (Szekely et al., 1996, Bolli & Emtairah, 2001). Typically, benchmarking of environmental performance involves the comparison of key figures among similar companies within an industry or a well-defined sector. However, other approaches are possible, as suggested by Richardsson (1998) and Sparf (2005).

Types of comparison possible in the benchmarking of environmental performance:

1. **Comparing performance within a company over time:**

   Involves comparing key figures periodically against targets and goals set in the environmental program
2. **Comparing performance against competitors:**

   The classic approach, but it do not always reveal best practice, or lead to improvements if the average level of performance within the sector is low
3. **Comparing performance against a set of well defined criteria:**

   Comparing key figures against legislative requirements, against eco-label criteria or other standards for a preferred environmental performance
4. **Comparing performance against best practice in a sector**

   Comparison against the best performance within a sector, based on either criteria or the best performing company in the sector

Environmental performance benchmarking has background and possible utilization as is illustrated in figure 1:

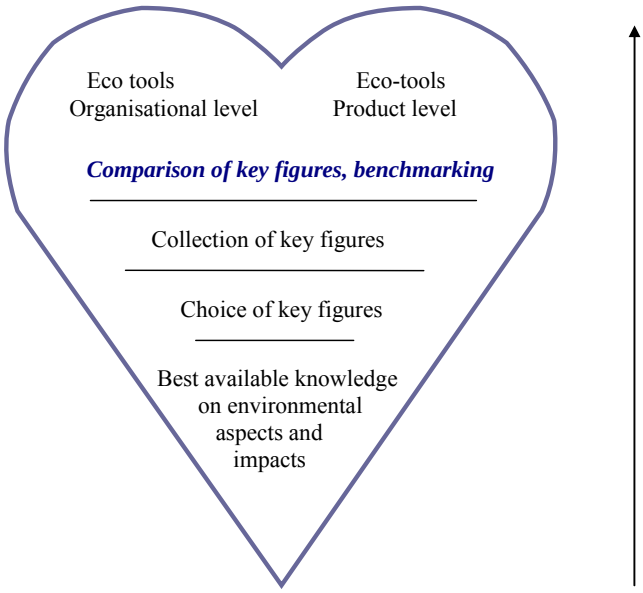

Figure 1: The diagram shows progress of benchmarking and utilization of environmental benchmarking.

Basic knowledge is needed to realize which environmental aspects and impacts are most important to work on. Using best available knowledge **key figures** are chosen, for example on use of energy, raw materials and production of waste. A company that intents to benchmark must **collect these figures** and then and only then can it **benchmark**. The benchmarking tool can be used in conjunction with other Eco-tools both on the organizational and production level (see Chapter 5).

Ideally, a company should start with internal benchmarking of environmental performance and move on to higher levels, as displayed in Figure 1.

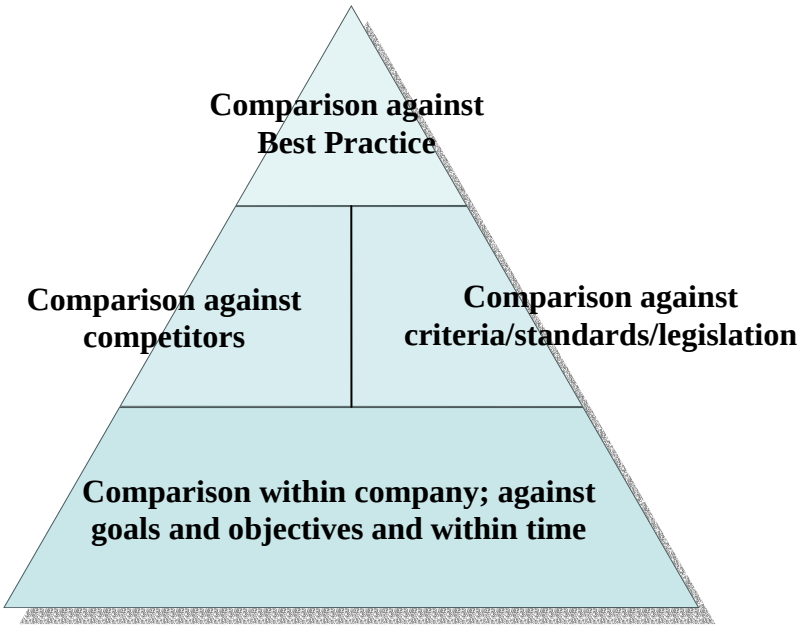

Figure 2: Levels of comparison in the benchmarking of environmental performance

4.4 Benefits and limitations of environmental benchmarking

The following bullets summarize the benefits and limitations of environmental benchmarking, followed by discussion.

The benefits of environmental benchmarking (Miakisz 1999; Szekely et al., 1996):

- Improved environmental performance
- Improved economic performance: lowered costs and improved competitiveness
- A good sense of the strengths and weaknesses of a company
- Identifying problem areas that might otherwise go unnoticed
- Identifying innovative solutions
- Increased accountability in the eyes of stakeholders
- A more proactive approach towards the environment and stakeholders

Matthews & Lave (2003) pointed out that in the absence of benchmarking their environmental performance, companies have no idea how they compare to their competitors or to the industries best practice. Benchmarking thus reveals whether environmental work is useful and has also revealed that environmental work does not necessarily lead to better environmental

performance. Eco-resorts were found to fail to achieve above average standards with respects to some dimensions of environmental performance (Warnken et. al., 2005).

The limitations of environmental benchmarking (Miakisz 1999; Szekely et al., 1996)

- Benchmarking requires sharing sensitive information between companies
- Quantified data must be comparable across companies
- The data collected must be reliable, and of high quality

The practice of environmental benchmarking is based on the willingness of companies to share information and experiences. This is both the greatest strength and greatest weakness of the concept. The success of an environmental benchmarking program is largely based on the extent to which companies are ready to give out numbers and measures about their operations, and even sharing best practices, i.e. providing valuable information to others on how to achieve what they have excelled in. Few companies are willing to do so without a good reason. One of the solutions to the problem is to make environmental benchmarking a joint venture between companies in the same field. A single company trying to collect data from other companies will most likely be met with reluctance and doubt, but if the venture is initiated by an **industry organization/association**, the situation might be different.

Companies might still feel doubtful, however. Miakisz (1999) has addressed this problem in his work. His solution is to provide companies with **protection for privacy**, in other words forming a confidentiality agreement, which ensures that the given data, for example numerical data regarding environmental performance, cannot be traced to an individual company.

Benchmarking of environmental performance is limited by its very nature to quantified analysis and comparison (Bendit, 1999). Although it is very useful to compare performance through key figures, one must be careful not to limit benchmarking efforts only to this type of comparisons, as it might not provide the answer to **"How can we improve?"** a question which requires the use of roles, strategic and process benchmarking. Bendit (1999) also notes that in order to find truly innovative solutions, it is often best to look outside industry borders. However, it remains a fact that benchmarking of environmental performance is the simplest approach, and thus most accessible for SMEs.

4.5 Indicators for benchmarking environmental performance

Companies have long used standard financial indicators to determine their business success. Only recently have a growing number of firms begun to use environmental, health and safety (EHS), and social indicators (Veleva & Ellenbecker, 2001). Whenever possible the indicators used should be quantitative.

An extensive European study (Measuring Environmental Performance of Industry, MEPI) has come to an important conclusion for the basics of environmental performance benchmarking. Statistical analysis revealed that a limited number of "**core indicators**" give a good

representation of the overall environmental performance of a firm (Wehrmayer et al. 2001, Økstad et al. 2001). A conclusion advice from the European study is to collect data more frequently and on fewer variables (Wehrmayer et al. 2001) rather than keep track of many indicators.

The first step in working out a benchmarking system is to understand which indicators should be used for the comparison. Indicators used for benchmarking have to be accurate and meaningful, to be the "**core indicators**" of Wehrmayers study (2001). Aspects of production that are to be used for comparison must be carefully selected to achieve accurate and meaningful indicators for benchmarking (Tölösi & Lajtha 2000). Knowledge of which indicators are relevant is available from several sources; for instance LCA studies, EMS and mandatory reporting and from eco-label initiatives. It is likely that in the future, companies will insist on being able to learn from this data and compare their own performance against others, against industry trends and against best performance.

Thus, when benchmarking it is important to keep the following in mind:

1. To concentrate on the **main environmental aspects**, in order to maximize results by unit effort. A useful perspective is to start by addressing impacts that are easy to mitigate, and those measures that would provide the greatest improvement (Stapleton & Glover, 2001).

2. To **measure environmental performance** by quantified **key figures**, also called environmental performance indicators or EPI's (Tyteca, 1996; Young & Welford, 1999). In order to assure comparability, they need to be measured exactly the same way in all companies in the benchmark to assure comparability. Typically, key figures also need to be normalized for benchmarking purposes, in order to allow for comparisons (Miakisz, 1999).

These two facts simplify the task of data collection and analysis for environmental benchmarking and indicate that it is possible to develop simple systems that give valuable environmental benchmarking information to SMEs. This conclusion is important because it indicates that by collecting a few indicators it is possible to get a good knowledge of the environmental performance of a company. This leads to the possibility of setting up a tool using only a few core indicators to measure environmental performance, in other words environmental benchmarking that is suitable for SMEs (von Krogh et al. 2002).

It is important to realise that indicator relevance varies by country and by context, as geographical, economic, social, ecological and institutional differences must be allowed for (OECD, 1998). As pointed out before, information on relevant key figures for each industry is available for most industries

5 Environmental benchmarking in relation to other environmental management tools

The European Commission has set up a list of useful environmental management tools (European Union, 2005). Environmental benchmarking is currently not listed among those tools, most likely because environmental benchmarking is still in an early phase of implementation in most companies and sectors.

5.1 Company/organisation-oriented tools

The following subchapter presents information on how environmental benchmarking interrelates with company/organisation-oriented tools such as EMS, green accounting and company-oriented eco-labels. Discussion on how environmental benchmarking can be used together with these methodologies is also provided.

5.1.1 Environmental management systems (EMS)

Matthews (2003) points out that EMS system can be adapted to allow internal corporate benchmarking of performance between different sites of the company to manage environmental issues across the firm. She discusses in details how that can be performed and points out the following three changes that would have to occur on the EMS framework. First, common goals would be required; Second, procedures to collect information related to the goals and report them are required; Third, management review must occur at a corporate level (this statement is still valid for the framework provided by ISO14001:2004).

It is pointed out that her ideas can be evolved further to allow comparisons on a strategic level and performance between different companies. Here is an un-detailed approach described.

Environmental benchmarking can be useful in the planning phase and to structure an EMS

- **Strategic benchmarking of the environmental policy:** It can be useful for companies to study environmental policies set by other companies and learn from them.

- **Benchmarking environmental management processes:** Learning how others are conducting EMS activities can be useful for successful implementation of an EMS. Issues that can benefit from comparison are for example how the environmental review is done and how environmental auditing is conducted.

- **Benchmarking of roles in environmental management:** Learning how others are organising their environmental management staff, responsibilities and procedures can also be useful.

For the bullets above it is possible to benchmark against competitors, within an industry and ultimately outside industry borders against Best Practice. For the first bullet one can gather information but the information is not centralized. For the second two bullets information is usually not available. One can point out that such a centralized system could be possible and valuable if companies are interested. A system discussed in a later chapter, SHEiiBA, approaches this kind of system providing mutual benefits to users providing such information through questionnaires to members.

Benchmarking is also useful in the checking phase of EMS. It is useful to:

- Compare environmental performance against time that is for **internal benchmarking of environmental performance**.
- Comparing environmental performance against one's competitors with the help of comparable key figures or by using data from green accounting (see chapter 5.1.3) that is for **external benchmarking of environmental performance:** The environmental performance of the company can also be compared against criteria/standards.

5.1.1.1 Miljøfyrtårn system

In the Nordic countries there exists a Nordic EMS system, the Miljøfyrtårn system specifically developed for SMEs; The system is a sector specific system for SME. The system contains criteria for over 60 sectors, and quite many SMEs use the system. Miljøfyrtårn has requirements on collection of key figures (green accounting) and sets standard of conducts. Miljøfyrtårn thus contains internal benchmarking like EMS systems but does not give access to data for external benchmarking.

5.1.2 Company-oriented eco-labels

Some Type I eco-labels and certification schemes are company-oriented, i.e. they apply for a company or organization as a whole, instead of a product. Examples of such schemes within tourism include the hotel criteria of the Nordic Swan and Green Globe 21. The Nordic Miljøfyrtårn is a company-oriented certificate program for SMEs. The program is sector specific, and includes criteria for companies in over 60 sectors. Miljøfyrtårn has requirements on collection of key figures (green accounting) (Miljøfyrtårn, 2005). Miljøfyrtårn thus contains internal benchmarking like EMS systems but does not require comparison with other companies.

Company-oriented eco-labels can be developed to allow benchmarking of environmental performance in cases where the criteria are quantified and comparable. Comparisons are then

made between similar companies within a sector. Existing eco-label schemes could be developed so that they would provide participants with data on where they stand in comparison with other participants.

5.1.3 Green accounting

Green accounting is a systematic way to measure important environmental factors. The prototype is common financial accounting. The official definition refers to green accounting as natural resource accounting or environmental accounting. (Economics & Development Glossary by David Abler, Pennsylvania State University, 2005). According to the European Union (European Union, 2005) green accounting can be useful in improving environmental performance and beyond that a key management tool for controlling costs, investing in cleaner technologies and developing "greener" processes and products. Recently many countries (such as Iceland, Denmark and Norway) have set legislation that requires polluting companies to keep green accounting in addition to their regular financial accounting.

Environmental benchmarking is an important aspect of green accounting and relates to the comparison of an organization's performance in a given field with that of the best companies (European Union, 2005). Green accounting gives actual figures on environmental performance using quantified indicators. If green accounting is performed in a comparable way it provides comparable data that can be used for benchmarking purposes to learn whether a company is using more energy, water or other raw materials than competitors. These figures are essential for benchmarking of environmental performance between companies.

Since the green accounting information is in many cases public, companies can access the information and benchmark their performance against their competitors. There is however the problem of comparability of the data provided by the companies. These data could be collected in a more comparable way in future and even be provided to the participating companies. This could have positive effects on the motivation of companies to comply with the procedure, as it would also provide business benefits instead of being just another time-consuming legislative requirement for companies. Benchmarking of environmental performance is the next logical step after green accounting.

5.2 Product and life cycle related tools

The following subchapters give information on how environmental benchmarking interrelates with LCA and product-oriented eco-labels. Discussion is given on how environmental benchmarking can be established as a useful tool for LCA, and how benchmarking can be carried out against eco-labels criteria.

5.2.1 Life cycle assessment (LCA)

LCA is a process that evaluates the environmental burdens associated with a product, system or activity by identifying and describing the energy and material uses and releases into the environment. LCA is a holistic approach that includes the entire life cycle of the product, from raw material extraction, through materials processing, use and disposal at the end of the product's life (from "cradle to grave"). Transportation steps are also considered.

LCA is considered to have a vital role in green accounting and sustainable development by reducing the consumption of raw materials and energy (European Union, 2005). LCA can help a producer understand **which** environmental problems are associated with a particular product/service and **where** in the product life cycle the main environmental burdens arise, helping to decide how to target resources for environmental improvements most effectively. LCA can also be used to analyze the effects of **changes** in production, raw material suppliers etc (Økstad et al. 2001, Rønning et al. 2002).

Benchmarking is relevant for LCA as:

- The results from LCA can be used for performance benchmarking. This can for example be done through EPD (see next chapter).
- LCA reveals the significant environmental aspects and which key figures/indicators are relevant. This information can be used to decide key figures to collect in green accounting and furthermore for benchmarking environmental performance.

Several industry associations forecast that there will be growing pressure for benchmarking between LCAs and against industry average (Jensen et al. 1997).

5.2.2 Product-oriented eco-labels

Examples of **Type I product-oriented eco-labels** include for instance the Nordic Swan, the German “Blaue Engel” and the European Flower. Product-oriented eco-labels are based on a set of criteria that products must fulfil in order to get the label. The criteria are typically based on a life cycle assessment of the product and developed by an independent expert panel in the sector. The criteria are commonly set stringent enough so that buyers can trust that the product is more environmentally friendly than the majority of similar products, but low enough so that a substantial portion of producers (10–25%) can reach them. Applicants must provide documentation (reviewed by a third party) on the product fulfilling the criteria before receiving the label.

Product-oriented eco-labelling schemes can be of use for benchmarking the environmental performance of a product, through comparison against the criteria. This can eventually lead to certification if the performance fulfils the criteria levels. The eco-labels could also be further developed to provide publicly available data on the performance of the participants, allowing competitive benchmarking. Or what is more likely, in order to protect privacy but still allow

comparisons to be made; eco-labelling schemes could provide their participants with benchmarking data regarding where they stand against average and best performance, such as the Green Globe 21 scheme (see chapter 6.2.3.3.1)

Environmental product declarations (EPD) Type III are independently verified declarations based on life cycle assessment according to ISO 14040-43. Criteria exist for carrying out and presenting this type of EPDs, including verification and competency requirements for those involved (Hanssen et al. 2001). Type III EPDs document the environmental aspects of a product in a life cycle perspective. A common format means that users (e.g. buyers) can compare competing products. Independent verification makes them credible and objective. They are also compiled in such a way that they can be used additively. This means that an architect should be able to calculate the environmental aspects of a building construction based on EPDs for all of the building components and compare environmental performance of material from different sources.

EPDs offer excellent opportunities for benchmarking the environmental performance of products between competitors, which is why its use for this purpose should be encouraged. Essentially, EPDs facilitate competitive environmental benchmarking by providing data about products for public use.

5.3 Integrated tools (covering organisations and products)

With introduction of extended producer responsibility systems in the industry, the more proactive companies have to assess their products in a full life cycle context, and not only the part they have the complete responsibility for. This means that a company does not only have to benchmark their own activities in a life cycle context of their products, but also benchmark companies and activities upstream and downstream, that is the supply chain (Økstad et al. 2001, Rønning et al. 2002).

Environmental Benchmarking will thus be an integration of tools that are related to organisations and companies, and products. A company need to know if the main challenges of its total product systems are for instance related to

- Acquisition and processing of raw materials
- Own manufacturing processes
- Transport and distribution of finished products
- Use of products
- Management of waste in the End of Use phase of products.

For a company that will take an extended responsibility of their own products, it is thus important to implement an integrated set of tools for environmental benchmarking, focusing both on benchmarking of

- Materials and suppliers of components
- Own manufacturing processes
- Logistics and packaging
- Use of products in relation to user needs and functionality
- Recyclability and management of waste resources.

Why is supply chain management of relevance to SMEs in the benchmarking context? Although SMEs do not have the resources available (in most cases) for extensive benchmarking between their suppliers, they will often be the **target** of supply chain management activities by their buyers – the larger companies. In order to stay at the top of development and maintain their customers, SMEs must address their environmental aspects and learn how others are doing things. An example of an environmental benchmarking tool that allows supply chain management includes Enviro-Mark™ (see chapter 6.1.3).

5.4 Summary of methods and tools interacting with environmental benchmarking

Environmental benchmarking is of relevance in conjunction with many environmental management tools and methodologies.

Benchmarking is of relevance at several phases in EMS, and is seen to have the capacity to improve the EMS of companies. Benchmarking of environmental performance can be performed internally or alternatively against competitors. Furthermore it is pointed out that the ideas of Matthews (2003) of adaptation of EMSs to allow benchmarking of environmental performance between different sites of a company to manage environmental issues across a firm can be evolved further to allow benchmarking of environmental performance between companies.

Green accounting has the potential, to provide a basis for competitive benchmarking. Green accounting is collection and often communication of relevant key figures for benchmarking, and it can thus allow public benchmarking between products if figures are collected in a comparable manner.

LCAs reveal the important environmental aspects and the key figures to be benchmarked of efficient performance environmental benchmarking. It does also allow comparisons between the environmental performances of products. In addition, EPDs that result of LCA can be used to compare products against each other.

Company-oriented eco-labels can be developed to allow benchmarking of environmental performance on a company level in cases where the criteria are quantified and comparable. Product-oriented eco-labelling schemes can be of use for benchmarking the environmental performance of a product, through comparison against the eco-label criteria.

It is likely that environmental benchmarking has been widely used by companies in an unconscious and a non-systematic manner. It is however important for companies to realize that they are using Environmental benchmarking in order to use it in a systematic manner to fully exploit the possibilities of environmental benchmarking. Conscious use is likely to give the best results.

6 Existing environmental benchmarking tools

Several types of tools are available for purposes of environmental benchmarking. The tools discussed here are categorised into three groups:

- Generic (non-sector specific) tools that can be used by any industry
- Sector specific tools for three Nordic industries
- Other interesting sector specific tools

6.1 Generic environmental benchmarking tools

There exist both generic and specific tools for benchmarking of environmental benchmarking.

6.1.1 Contour

Contour is a strategically and performance oriented environment, health and safety (EHS) benchmarking tool which gives companies immediate feedback on their management, processes and performance under eight key areas of environment, health and safety (www.cbi.org.uk, retrieved 01.05.05). Currently over 250 companies, both in the UK and abroad participate in the program that is managed by 14001 Solutions/White Young Green Environmental.

The program facilitates identification of good practice and performance and benchmarking against internal units within the same business, previous results or other Contour users (all or sector specific). The results are presented graphically on scales of performance and practice that identify the company as World Class, Contender, Promising, Vulnerable, or Could Do Better in addition to showing the scatter of other companies. In addition, participants receive data on their strengths and weaknesses as well as opportunities and recommendations for improvement.

Contour has been adopted by a range of large organisations. These companies have been able to use the data to develop their EHS strategies and move towards world-class performance in this area. Unfortunately, Contour is neither cheap nor simple to use.

6.1.2 e-Bench

e-Bench is an Internet enabled audit and simulation/modelling tool that is used to record systematically whatever energy or utilities an organization is consuming and to relate these to the core business activity. The system then benchmarks these input factors to identify how efficiently they are used with other users in the database.

At the heart of e-Bench is a model simulating the core business activities of the organization using e-Bench. For example, if it is a building, it will be a model of the physical structure, i.e. what the roof, walls and floors comprise, size of floor areas, etc.

After the appropriate model is selected and parameters established (such as size of physical plant or operations), then further climate, utilization, consumption and core business activity data is deployed in e-Bench. e-Bench is able to interrelate various inputs to each other in accordance with the rules, formulas and routines set out in a model. After various calculations, e-Bench produces a series of indicators customized to the organization's core business, which are in turn benchmarked against other comparable users to determine a relative efficiency and ranking.

Capturing all of this variability allows e-Bench to truly compare "apples with apples" and provide realistic and meaningful outputs never readily available before. Furthermore, e-Bench effectively corrects or normalizes for virtually everything that an organisation or its energy/plant/process manager cannot control, such as the climate, orientation and exposure of buildings, humidity, geography, altitude, physical constraints of the building construction (type of materials, size, amount of glazing etc), occupancy, intensity of use, items processed and other factors (www.energyts.com, retrieved 15.06.05).

This tool is designed and used by large corporations, but the methodology behind it could be used to develop a program for SMEs.

6.1.3 Enviro-Mark™

Enviro-Mark™ is a strategic environmental benchmarking system operated by Enviro-Mark Systems Limited and designed especially for use in supply chain management (enviro-mark.com, retrieved 30.06.2005). The program has been successfully used in the UK, Ireland and New Zealand. The tool is not sector or industry specific and it is completely web-based. Issues of environmental management are addressed through a step approach in which businesses self-determine their current level of achievement against five benchmarks. The five steps of the program are:

- **Bronze:** Compliance – legislative issues
- **Silver:** Commitment – environmental aspects and policy
- **Gold:** Continuous improvement – objectives and targets
- **Platinum:** Competence – EMS
- **Diamond:** Certification – auditing

  The program takes companies through a development process, allowing them to choose a target level based on the requirements of the market and stakeholders. According to David Bower, Director at Enviro-Mark, even reaching the Bronze level is a major commitment for SMEs, due to the complexity of environmental legislation facing them (Bower, David, Enviro-Mark Systems Limited: e-mail 30.11.2004).

However, some of the aspects of the program could be useful in the development of a Nordic SME tool for benchmarking.

Among users of Enviro-Mark™ are BT and Vauxhall Motors in UK and Ngāi Tahu Seafood Limited one of the top six seafood companies in New Zealand.

6.1.4 The GEMI Primer for Environmental Benchmarking

The Global Environmental Management Initiative (GEMI) is a coalition of large businesses aimed at providing strategies for businesses to achieve Environmental, Health and Safety (EHS) excellence, economic success, and corporate citizenship (Global Environmental Management Initiative, 2004, www.gemi.org). The group introduced their primer for environmental benchmarking in 1994. The primer is not industry or sector specific, and is accessible to everyone free of charge through the Internet. The tool can be used as a framework for any kind of benchmarking, whether focusing on roles, strategic issues, processes or performance. According to GEMI, the purpose of the primer for benchmarking is to provide a tool for Total Quality Environmental Management (TQEM) and act as a road map or guide for managers embarking on a benchmarking study (Global Environmental Management Initiative, 1993, 1994). The guide recommends undertaking benchmarking with several partner businesses, in order to share costs and maximize benefits, thus allowing for co-operation. GEMI uses a nine-step process of environmental benchmarking adopted from AT&T (1992). Table 21 presents the primer steps:

Table 3: Steps of the GEMI Primer for environmental benchmarking

Step		Issues Addressed
1.	Project Conception	Scope, Resources, Schedule, Team
2.	Planning	Project Plan and Management
3.	Preliminary Data Collection	Criteria, Techniques, Sources, Baselines
4.	Best-in-Class Selection	Who is Best-in Class?
5.	Best-in-Class Data Collection	Site visits, Interviews
6.	Assessment	Gap analysis, Sources for Improvement
7.	Implementation Planning	Strategies and Plans for Change
8.	Implementation	Monitoring and Managing Change
9.	Recalibration	Continuous improvement

The primer is a good basic example of how environmental benchmarking can be conducted. The greatest achievement of the system is having established environmental benchmarking as a viable tool in the field of environmental management. Many of the environmental

benchmarking systems available today have clearly applied some of the approaches originated in the GEMI primer.

GEMI currently has 41 member companies, among them are 3M, ConAgra Foods, Johnson & Johnson, Dell, DuPont, Coca Cola and FedEx.

6.1.5 SHEiiBA

The Safety, Health and Environment Intra Industry Benchmarking Association (www.sheiiba.com) was founded in 1996 and formally launched in 1997. It was formed in response to the recognition that many leading companies were eager to learn how others in different sectors managed Health, Safety and Environment and to compare their accident performance.

From the start the emphasis was on benchmarking processes and strategies rather than performance; to provide a mechanism for companies to share practices with one another and to find new routes to improvement by adopting what was found to work elsewhere.

Over the past years nearly 300 questions have been asked by members and an unrivalled database of know-how has built up. In its library, 600 documents now provide a wealth of information for the benefit of its members and around 50 league tables record accident performance across a range of key performance indicators. Again, the tool is designed and used mostly by larger companies, but incorporates many interesting aspects that could be incorporated in a Nordic SME tool for benchmarking.

6.2 Sector specific tools in three Nordic SME industries

The study focuses on three typical SME sectors in the Nordic region. The study provides a view of available benchmarking tools within each sector. A review of environmental challenges present in each sector is provided and from these are derived aspects to be considered as comparable key figures for benchmarking of environmental performance.

6.2.1 The fishing industry

The fisheries sector is here described as companies involved in fishing fish, processing the fish, packaging it and transporting long distances to European customers. This sector is big in many Nordic countries and an important economical sector in many rural areas. The main emphasis here is on processing trawlers.

6.2.2 Environmental challenges in the fishing industry

Based on a handful of life cycle studies of different sizes of fishing boats and trawlers the energy use of the fishery is the predominating environmental factor causing by far the greatest impact on the environment and should be given proper attention in relation to that. Processing of the fish, transport and storage come secondary to the fisheries (Eyjólfsdóttir et al, 2003; Ziegler et al, 2003).

Several studies have focused on **oil consumption of fishing ships** from different points of view (Rúnarsson, 2001; Huse et al., in print; Ziegler & Hansson, 2003). The main finding is that the oil consumption varies both with fishing methods and regions. For bottom trawls, it is on the average around 0.6 to 07 l oil per kg. un-gutted cod and emission of CO2 is reported to be 1759 g/kg fish (mixed ungutted catch) in Iceland, but 3782 g/kg fish in Sweden. (Eyjólfsdóttir et al, 2003. When analysed further it has been revealed that operation of the fishing gear accounts for over 70% of the total oil consumption during the fishing trip (Eyjólfsdóttir et al, 2003). Transport from the fishing harbour to European customers has also some, but relatively little contribution to energy consumption.

LCA studies on fisheries have not yet been adapted to measure the **effects on fish stocks and on habitats** like the sea bottom. The scale of the underestimation is probably considerable as: One kg of fillet needs sweeping of approximately 2300m^2 of seafloor (Eyjólfsdóttir et al, 2003). And the effects on fish stocks and habitats are often considered the most pronounced effect of fishing. Myers et al. (1996) considers the decline in many fish stocks as the most important factors due to fishing, and Kaiser & de Groot (1999) consider the effects on non-targeted species and habitats to be very important. Biodiversity and the ecosystem of the sea and the food web are considered to be under direct and indirect stress and under continuous change due to trawling activities (Jennings & Kaiser, 1998).

It is important to realize that the size of the fishing stocks, i.e. density of catch, has important effects on energy per unit catch and the sea bottom swept. As the fish stock is in better condition, the catch per unit of fishing effort is greater and thus less effort is needed to catch a kilo of fish (Eyjólfsdóttir et al, 2003).

FAO has set forward a code of conduct for eco-labels in fisheries. The code of conduct focuses on the effects of fishing on the fish stocks and thus the density of the stocks.

Transport from the fishing harbour to European customers has also some but relatively little contribution to energy consumption.

An environmental benchmarking tool for fisheries should thus address the following aspects:

- Use of energy for fishing
- Area swept to catch fish
- Condition of fish stock
- Possible transport of the fish produced

6.2.2.1 Environmental benchmarking in the fishing industry

There are so far no good examples on environmental benchmarking systems from the fisheries sectors, neither on product nor on organisation level.

6.2.2.2 Other opportunities for environmental benchmarking in the fishing industry

No available tools were found that give good possibilities to approach benchmarking.

6.2.2.3 Other eco-tools

As there are neither examples on environmental benchmarking systems nor available tools that approach benchmarking short discussions are given on available eco-tools. The four eco-tools found are listed with a short description on each. Many of the methods lack integrity and maturity.

Fish and other food products have not been included in the Nordic Swan system for strategic reasons, as it would be in competition with other systems (KRAV etc). The **Miljøfyrtårn** certificate program contains criteria for fisheries on an organisational level. The program could be further developed to provide benchmarking data for participants.

No system has been developed so far to describe the material intensity of fisheries but guidelines for the eco-labelling on fish stocks have been developed by FAO (www.oceanlaw.net/texts/faocode.htm, retrieved 30.06.05). The guidelines focus on the effects of fishing on the fish stocks and thus the density of the stocks. In the future, LCA results could be used to compare the environmental effects of various fishing methods, between stocks and between companies.

Eco-label schemes for fisheries include:

- **The Dolphin Safe eco-label**: A label that guarantees that the tuna in question was not fished using drift nets that can lead to by-catch of dolphins.
- **Naturskånsomt fiskeri**: The main aim of the label is to avoid overexploitation of fish stocks and thus struggle for sustainable fisheries.
- **The Marine Stewardship council eco-label**: A label stating that the fish in question comes from a sustainable stock. Considerable debate has been on the fish stocks that have received certification.

Various energy saving programs are currently conducted, such as a study to save energy by using eco-design in the designing phase (Norrblom et al., 2000, Yngvadóttir & Arason, 2001, Ágústsson personal communications) and developing an energy saving improvement simulator. The first desktop studies are being performed on the utilization of sustainable energy, namely hydrogen. Such studies could also benefit from a benchmarking approach, namely by comparing various energy savings schemes to find out the most effective solutions.

To conclude, it can be stated that the fisheries sector has not reached far in the quest for becoming environmentally friendly. Existing EMS and environmental knowledge is often deficient and the social discussion of the environmental issues lacking (Einarsson 2003, Eggertsson 2003). However, Einarsson (2003) has pointed out that at least in Iceland, the companies are motivated by their industry association (The Federation of Icelandic Fishing Vessels Owners, LÍÚ). It is important to boost the development of suitable and user-friendly environmental tools for the fishing industry. Environmental benchmarking aspects should be taken into consideration in the development of such tools.

6.2.3 The packaging industry

The packaging sector is in this context described as companies involved in:

- The production of packaging materials, with focus on the four main types of packaging materials: glass, fibre, metal and plastic
- Converters of materials to packaging solutions, both primary, secondary and tertiary packaging

In the total packaging chain, also users of packaging (tapers and fillers), distributors and the retail sector are important elements. The packaging sector is thus a big economic sector in most countries, including both large multinational companies and SMEs. Typically, a few large companies contribute with the most to the total economy in the society, while the role of SMEs is more distributed.

6.2.3.1 Environmental challenges in the packaging industry

Based on a number of LCA studies of packaging systems and packaging materials, it is clear that the most significant environmental aspects of the sector are related to **the acquisition and processing of raw materials** for all types of packaging solutions (Økstad et al. 1998). Use of fossil fuel energy resources and conversion of fossil fuels is the main contributor to environmental impacts in the total life cycle of packaging systems. Impacts include emissions that result in/affect climate change, acidification, eutrophication and photochemical oxidation. Emissions of toxic substances to water and soil are also much related to raw material acquisition, e.g. mining of metals from ores.

How much emissions and resources are consumed in further material processing will to a high degree depend on the amount of **recycled materials** used. The effect of using recycled materials as a part of the raw material input is highest for materials that have the higher environmental burdens in raw material processing (e.g. some metals, glass and plastics). Use of bio-energy and waste in the material processing plants will also result in reduced emissions from the processing plants.

Conversion of packaging has in general a low contribution to the total environmental burden of packaging systems. One exception is related to printing and surface finishing of packaging (e.g. plastic and metal packaging), which can have emissions to air of organic compounds and to water and soil from cleaning plants.

Transport between the different parts of the value chain can also have significant contribution to energy consumption in for instance paper fibre materials and for some of the more heavy or voluminous packaging solutions (glass pots, bottles etc). Transport will contribute more or less to the same environmental burdens as conversion of fossil energy in the process plants.

Consequently, an environmental benchmarking tool for packaging should address the following aspects:

- Material production with focus on energy consumption and related emissions
- Use of recycled material in packaging material production
- Transport of heavy packaging materials and voluminous and/or heavy converted packaging
- Ease of decomposition and recycling of materials from used packaging.
- For paper fibre products: the origin of materials (that it is not coming from areas with high biological value (FSC (Forest Sustainability Certification) or PEFC (Pan European Forest Certification)).

6.2.3.2 Examples on Environmental Benchmarking in the packaging sector

There are no examples on specific environmental benchmarking systems in the packaging sector at present, neither on the product level nor on the organisation level.

6.2.3.3 Other opportunities for environmental benchmarking in the packaging industry

As there are no examples on specific environmental benchmarking systems from the packaging sector, a discussion on other available tools that are relevant for benchmarking is provided below (Rubach & Hanssen 2002). Packaging has not been involved in the different eco-labelling schemes, as a label on the packaging can easily be misunderstood as a label for the product. In the Nordic Swan system, there are thus only two examples of criteria related to packaging[1].

A few packaging solutions have been preliminary approved as EPDs in the Norwegian system (www.epd-norge.no, retrieved 30.06.2005). They include plastic bottles for chemical products, milk cartons and fish boxes for transport of whole, fresh fish. The data from these can be used for environmental benchmarking purposes.

As part of the Norwegian Packaging Covenant between the Packaging Sector and the Ministry of Environment, a system for measuring the material intensity and transport efficiency of packaging solutions (The Shopping Basket Project) has been developed. The project measures the progress in packaging material intensity from year to year for 24 product groups. In each group, data from the three market leading products on the market and the most rapidly growing product is gathered and analysed, making it possible to benchmark

[1] Packaging envelops (i.e. a simple transport packaging for smaller items through postal services) and Packaging paper (i.e. fibre paper that is a part of packaging material). The interest for both is low, as no products have been approved for the first group and only four products to the second.

packaging solutions against the economically most important products, although those are not necessarily the most efficient solutions (Rubach et al. 2005).

Within the packaging sector in Norway, there is also another initiative that is related to the Packaging Covenant, the National Packaging Indicator project (Hanssen et al. 2003, Rubach et al. 2005). This project is also focused on material intensity, and development over time. This project focuses however on the packaging users, i.e. tappers and fillers within 15 different sectors. The unit of study are companies, which report to the project how much packaging has been used during a year in relation to total turnover in the company. In this survey, all packaging solutions are categories within primary or secondary/tertiary packaging, as reusable and non-reusable solutions and within one of the four main types of packaging materials. Companies can thus compare their own packaging material intensity against a sector average or against other companies (anonymously reported in the study).

Companies can also compare their own packaging material intensity over time, to evaluate effects of measures to optimise packaging systems and reduce material use. Some Norwegian companies have included these types of studies in their Annual Environmental Report, as packaging is a significant aspect in their environmental and resource performance. If a company wants to go deeper into the effect of packaging optimisation, these types of material intensity data can also be combined with emission and resource coefficients, and give more complete environmental performance data for packaging use and optimisation.

6.2.4 The tourism and travelling industry

The tourism industry is here understood to be businesses involved in the process of attracting, transporting, hosting, managing, serving and catering for the needs of tourists (adapted from Weawer & Oppermann, 2000 and Goeldner and Ritchie, 1995).

Tourism is one of the world's most important economic sectors (Weawer & Oppermann, 2000) and its status in the Nordic countries is steadily increasing. Typically, the majority of businesses in the tourism industry are SMEs.

6.2.4.1 Environmental challenges in the tourism industry

The main environmental effects of tourism are related to the travel between places, the impacts on site, resource use and waste production.

Life cycle studies have revealed that the most important environmental factor in tourism is the transport of persons between places. Among travel activities, long-range flights are by far the most dominant element. Thus, minimizing the environmental effects of air travel is considered the only way to attain significant reductions in environmental impacts (Hischier & Hilty, 2002). As both the mass of people and prosperity increases worldwide it is not realistic

to expect reductions in air travel, so solutions must be based on environmentally friendly energy sources.

Tourism also invariably affects physical and biological environment at destination site. Habitat destruction and disturbance of wildlife are common environmental aspects. These aspects vary between the geographic location and the activity in question. Resource use is another major aspect, whether concerning energy, materials or water. This aspect is closely related to the production of waste, which is also a major concern as tourism numbers continue growing (Weawer & Oppermann, 2000).

The environmental effects of tourism are relatively well known and systematic effort has been put into addressing them through initiatives such as eco-tourism and sustainable tourism, which are fast growing segments of the tourism market (Pujari et.al., 2003). In addition, over 100 tourism eco-labels and certification schemes exists worldwide (Voluntary Initiatives for Sustainable Tourism, 2002).

The problematic aspect of the tourism industry is that it consists of so many sub-sectors, such as accommodation, travel agencies, tour operators, airlines etc. that makes it very hard to establish industry wide efforts/systems/guidelines for improving environmental performance. Eco-labelling schemes usually try to solve this problem by addressing each of the sub-sectors separately, using different indicators for each.

The following aspects should ideally be taken into account in an environmental benchmarking tool for tourism:

- The travel: mode, distances
- The impact on the natural environment: land, water, air, habitats
- Resource use: Energy, Water, Materials
- Waste management: Minimizing waste, Disposal, Recycling

6.2.4.2 Environmental benchmarking in the tourism industry

The majority of environmental initiatives within the tourism industry are related to sustainable tourism and eco-tourism or alternatively eco-labelling and certification schemes. Eco-labels are popular in the sector as they provide a clear message to the customers: “We are environmentally friendly”. Pure environmental benchmarking tools without certificates or labels do not provide such external benefits in the form of an improved environmental image.

Worldwide, a few tools exist with the tourism industry that applies environmental benchmarking methodology. The examples presented here are available for application in the Nordic countries and include the Green Globe 21 eco-label and two benchmarking tools,

namely Benchmark hotel and TourBench. All three tools focus on environmental performance benchmarking.

As the example of Green Globe shows, eco-labels can offer their member companies added value by showing them where they stand in comparison to others. The information is there, collected from member companies, and often in the form of quantified relative indicators – so why not use it and allow members to improve their business and environmental performance through comparison with others? However, a survey on environmental benchmarking (Sparf, 2005) revealed that environmental benchmarking is a little known methodology in the Nordic tourism industry. More work is needed to raise the awareness of the benefits of benchmarking tools within the industry.

6.2.4.2.1 Green globe

Green Globe 21 (GG21) is a global benchmarking and certification system for tourism and travel based on the principles of sustainable development (www.greenglobe21.com). The World Travel and Tourism Council (WTTC) launched Green Globe in 1994 (upgraded in 2001 to include actual performance measurements). GG21 currently operates in 54 countries and is available for 26 sectors within tourism including for example tour operators, accommodation, car hire, restaurants, activities, airlines and construct and design of buildings. A separate standard is available for destinations. Currently over 460 companies worldwide are in the program. Participation from the Nordic countries has been relatively low, excluding Iceland (38 participants, 29.06.2004). Only one other Nordic company (from Norway) is a participant.

The tool is based on three levels, namely Affiliate, Benchmarking and Certification or ABC (Green Globe, 2004). The affiliate level is an introductory phase where companies show their commitment and prepare for the next level. In order to receive the Benchmarked status companies must annually reach Baseline levels (criteria) of ten quantified general or sector specific indicators, as well as having an environmental and social sustainability policy in place. The indicators are set by EarthCheck™ www.earthcheck.org, (an independent third party) and they address the following issues: Greenhouse gas emissions, Energy efficiency, Conservation and management; Management of freshwater resources, Ecosystem conservation and management, Management of social and cultural issues, Land use planning and management, Air quality protection and noise control, Waste water management, Waste minimization, Reuse and recycling. The indicators were chosen so that they would be simple to measure and use, while still reflecting the most significant environmental aspects of tourism globally thus enabling global and local success. They are based on worldwide work on indicators and built in order to allow benchmarking (e-mail, Kjartan Bollason, Green globe Iceand 30.06.05).

The criteria levels are set separately for each country by a panel of experts, in order to allow for national conditions. They are set to represent average performance, and chosen to reflect

the main environmental aspects of tourism operators while still being easy to acquire. Companies wishing to obtain full Certification must also address their legislative framework, have an EMS in place and fulfil other detailed qualitative requirements. Benchmarking level is based on self-assessment, whereas full certification requires an annual on-site audit by an accredited auditor. Each level includes a distinct logo for marketing purposes.

The benchmarking aspect of the scheme focuses on environmental performance. Members receive a benchmarking report that shows them their status for each indicator in relation to the average performance and best practice- levels that are set by Green Globe. However, comparison against competitors is not provided in order to allow for privacy. This feature could be added in the future when more companies participate, making confidential comparisons possible. Currently, all the sectors in GG21 focus on tourism, but in the future the system might be developed further by adding other industry sectors.

The Icelandic experience of benchmarking with GG21 is positive and encouraging. The system is a valid and efficient manner of measuring the environmental performance of a company. In addition, it results in business benefits and offers possibilities for environmental reporting (e-mail, Kjartan Bollason, Green globe Iceland 30.06.05).

6.2.4.2.2 Benchmark hotel

Benchmark hotel (www.benchmarkhotel.com) is an environmental benchmarking tool for hotels. The tool was developed by the International Hotels Environment Initiative (International Hotels Environment Initiative) and The World Wide Fund for Nature (WWF) in UK. Hotels wishing to participate submit a registration through the website. Information on the numbers of participants is classified (e-mail 25.11.2004, Kate Martin, International Tourism Partnership). The website is divided into a public and private area, with access to the private area where the benchmarks are collected and results presented being available only for registered users. The tool is available to all hotels worldwide though the Internet. Different hotel profiles are available for luxury, medium and budget hotels and separately for Temperate, Mediterranean and Tropical climates.

The environmental aspects covered by the tool include energy use, water consumption, waste-water quality, waste minimization, purchases and chemical use. The tool also helps hotels to keep track of the volume of key resources consumed. Hotels decide themselves on targets for improvement. One of the greatest advantages of the tool is that provides hotels with an accurate assessment on where they stand compared to other hotels of similar size and facilities, but it does not offer certification and thus has no effect on the environmental image of participants. In addition, the tool is only available for hotels, so other sub-sectors of tourism cannot benefit from this tool.

6.2.4.2.3 TourBench

TourBench (www.tourbench.org) is a monitoring and benchmarking initiative for managing environmental impacts and costs in tourist accommodations. The tool is available for accommodation services across Europe, allowing them to access their own performance in time and compare to that of other accommodation services within their native country or in other European countries. The indicators to be compared were chosen from the experience of the participants developing the system, using existing knowledge and experiences of the tourism accommodation businesses.

TourBench is funded by The European LIFE Project (LIFE - the Financial Instrument for the Environment) and is a demonstrational tool for the tourism sector. The tool has been publicly available since October 2004 and half a year later it contains 250 regular users, regularly inserting data. Four of these users are Scandinavian and of these four users, three belong to one company (van den Heuvel, Christoph: Syncera Leisure, e-mail 21.06.2005). The tool is based on a monitoring and benchmarking system developed for Dutch tourism businesses in 1999 by Syncera Leisure. Dutch experiences have shown that registration and monitoring raise awareness about environmental impacts and costs and lower them in the end (van den Heuvel, Christoph: Syncera Leisure, e-mail 02.12.2004).

The tool requires participants to gather data on the input of consumption of (and costs for) energy, water, chemicals and waste production. No specific criteria is set forth regarding what the performance should be, but the tool outlines priority measures that the business in question should focus on, providing practical guidance on which areas are subject to improvement and on ways to decrease expenditures and improve efficiency. It provides a tool to calculate return on investment costs for several improvements.

The system has the capacity of providing accommodation services with help in identifying and meeting the standards to obtain a relevant eco-label. Businesses that are already certified can use the tool to measure their environmental consumption, in doing so fulfilling one of the most important requirements of most certificates and eco-labels. Overall, this tool would provide the best benefits if used in co-operation with a certified EMS, an eco-label certificate or award scheme as it does not have the capacity to improve environmental image *per se*.

6.2.4.3 Other opportunities for environmental benchmarking in the tourism industry

It is not feasible to give a detailed description of all the tools available for the tourist sector. Already in 2002, the number of different tools specially developed for this industry had passed 100, counting structured environmental benchmarking systems, eco-labels, awards and self-commitments (Voluntary Initiatives for Sustainable Tourism, 2002). Half of the tools are considered to contain serious life cycle considerations. As a LCA has revealed that it is actually the long distance travel that is the hot spot in the tourism sector it would be useful to have more tools focused on the travel itself.

Some of the tools have already implemented benchmarking against average performance and a higher performance (such as against the top 30% performers) but only a few against the very best performers. It is crucial that tourism eco-labels provide their participants with benchmarking data in the future. Some of the leading schemes have declared that one of their next steps to improve their requirements is to develop a benchmark system based on regular reports on resource consumption (Voluntary Initiatives for Sustainable Tourism, 2002).

6.3 Other sector specific tools

Benchmarking tools were found in other sectors than the three sectors studied. None of the mentioned tools is available in English or in a Nordic language. However, the Milieubarometer is pointed out to the readers as an interesting tool for SMEs.

6.3.1 Milieubarometer (Environmental Barometer or Ecomapping)

This is a monitoring and benchmarking tool for small and medium enterprises (SMEs) in the Netherlands (www.milieubarometer.nl or www.ecomapping.org). The tool is only available in Flemish. It was launched in 1999. It is a visual tool based on several maps of the company, where each map approaches an environmental problem. The maps approach urban situation, water, soil and storage, air and odour, dust and noise, energy, waste and risk and safety. Each map is a mini environmental audit with location of environmental problem. The user is asked to evaluate the magnitude and collect informative facts of the environmental problems. The tool is CD based but is currently in the process of being web-enabled and is expected to become web based in a year or so. This tool is suitable for industrial companies, professional services companies, the health care sector and governments. The current version is the fourth version and it is custom made for the following branches:

- Garages and car repair companies
- Graphical industry
- Wholesale companies and distribution centrals
- Wood processing industry
- Offices
- "Metal electro" industry
- Meat processing industry
- Hospitals
- Health care organizations

The indicators are chosen with national legislations and LCA in mind. The results are presented graphically and are both given in costs and in environmental points (e-mail Christoph van den Heuvel, 24.06.05 and 27.06.05; e-mail Adriaan van Engeln, 29.06.05).

6.3.2 NVRD Benchmark

NVRD Benchmark is an online benchmarking tool for NVRD (www.nvrd.nl), the Association for Refuse and Cleansing Management in the Netherlands. The tool was first launched as a paper version. The tool is only available in Flemish and there are no plans of translating it to other languages. The tool was custom made for NVRD, and can only be used by their members. Therefore it will not become available in other languages or for other sectors. The members of NVRD pay an annual fee to NVRD for which they can also use the benchmarking tool.

Based on experiences with building TourBench an online version of this paper benchmarking tool has been developed and at this moment about 100 businesses are using the internet tool (e-mail Christoph van den Heuvel, 24.06.05 and 27.06.05).

6.3.3 GIMNET

Gimnet (www.gimnet.nl) is a Dutch benchmarking tool for municipalities, 'waterschappen' (literally translated: Water Boards), whose main concern is the surface water in their region and provinces. The tool is only available in Flemish. No information is available in English (e-mail Christoph van den Heuvel, 24.06.05 and 27.06.05).

6.4 Summary on environmental benchmarking tools

The three sectors have diverse environmental challenges and different approaches to environmental issues. Availability of sector specific environmental benchmarking tools is very different; the tourist sector has four tools while the other sectors have none. Availability of generic environmental tools to work on environmental effects is better.

No Nordic environmental benchmarking tool exists currently. Most of the available tools are available in English but others are only available in languages that are inaccessible to most Nordic industries. As none of the tools is Nordic it is not surprising that none of the available tools has become generally used or known in the Nordic countries.

7 Summary and Conclusion

Is there a need in the business society in general and in the SME sector specific for Environmental Benchmarking tools today?

In the end it comes down to the old proverb, "You cannot manage what you cannot measure". Still, only a handful of SMEs measure environmental performance against targets even though environmental aspects like energy use, waste and water are often substantial percentages of the total cost structure of companies.

Environmental benchmarking tools provide information on environmental performance gaps. The mere knowledge of lack of performance can lead to enhancement. Some tools furthermore give information on the potential of improvements.

7.1 Main findings

A handful of available systems were found.

The only Nordic sector studied that had available environmental benchmarking tools was the tourist sector.

Environmental benchmarking in relation to other eco-tools

Environmental benchmarking interacts, and can be a supportive tool, with several eco-tools. It is so straightforward to use comparison in and between companies working with eco-tools and environmental key figures that it is likely that environmental benchmarking has been widely used unconsciously and in a less or non-systematic manner. It is however important for companies to realize that they are using Environmental benchmarking as conscious use is likely to give better results.

In sectors, where there are no ready made environmental benchmarking tools, there is often lack of data on best performers to benchmark against. In those branches it is possible to approach benchmarking by using comparison against available information. In some industries and for some products it is possible to benchmark against average performance. In other cases it is possible to benchmark against Eco-labels criteria and thus against better performing companies.

EMS

Environmental benchmarking used in conjunction with EMS would give information on the environmental performance of the installed EMS of a company. It could thus add value to the effectiveness of the system. Integrating Environmental benchmarking and EMS allows

internal corporate benchmarking of performance between different sites of a company to manage environmental aspects across a firm (Matthews, 2003) and it has been pointed out that this idea can be taken further to allow benchmarking between companies if such interest would arise.

Green accounting

Benchmarking can also be seen as add-on-tool to green accounting as comparison of green accounting data within a company or between companies gives extra value to the data.

In some of the Nordic countries, it is mandatory to perform green accounting for specific types of industries. If the data are collected in a comparable manner, the green accounting data provide a useful dataset for benchmarking. This could be achieved by encouraging such development through the industry for example through industry association's recommendations on how to execute the accounting. This could also be performed through obligatory pathways.

Eco-labels

Type I eco-labels seek to assure the customer that they are buying products that have little impact on the environment. Detailed and stringent eco-label criteria, based on material and energy use have been established for many products. It is possible to approach benchmarking and compare performance against these criteria and thus against better performing companies.

Many eco-labels and other eco-tools possess valuable information on best performers and thus good data for benchmarking against better or best performers. Some of the eco-tools have considered going into more detailed benchmarking for their customers (Voluntary Initiatives for Sustainable Tourism, 2002). This can lead to increasing availability of performance data to benchmark against and to further evolution of environmental benchmarking.

Life Cycle Assessment (LCA)

Tools like LCA provide important basic knowledge on which environmental aspects are most important to control with methods like environmental benchmarking. Environmental performance of products can furthermore be compared using LCA results through EPD Type III.

Existing environmental benchmarking tools

A handful of environmental benchmarking tools were found. The tools are young and undergoing fast development. Most of the tools allow benchmarking against best performers. Some of the tools provide recommendations on improvements. One of the tools, TourBench, includes a calculation tool that calculates return of investment for several improvements among which are energy saving light bulbs, surface insulation and solar panels. The majority of the obtainable tools are offered in English, a small number of them are furthermore offered

in some of the Nordic languages, and a few are only available in other languages. None of the tools were of Nordic origin.

For full exploitation of environmental benchmarking it is important that data are up to date. Thus it is wise to use web based tools. Some of the environmental benchmarking tools are web based.

Evaluation of tools in relation to environmental challenges in three Nordic SME sectors

The tourist sector and the financial sector have revealed the usefulness of environmental benchmarking (Matthews & Lave, 2003) and the tourist sector has started to exploit it both in conjunction with eco-labels and as a stand-alone tool. Among the sectors studied the tourist sector was the only sector possessing environmental benchmarking tools. It has four existing tools; three of these are available in English and one only in Flemish. Even though the packaging industry did not possess environmental benchmarking tools it had some approaching eco-tools available. The fisheries sector on the other hand had a meagre selection of available tools to approach benchmarking.

It is interesting to consider why these vast differences of available environmental tools exist between the sectors studied. Why is it that the tourism has abundant numbers of available eco-tools including some environmental benchmarking tools while other sectors have only a few tools available and none of those truly environmental benchmarking. This can be a coincidence but it can also be for a reason. If there is an explanation, it can be informative for further development of eco-tools. The administration of the environmental benchmarking tools in the industry were asked this question but without clear answers.

Here it is thus suggested that this difference between the sectors can be due to differences in marketing approach to customers and thus marketing pressure experienced. One particularity of the tourism sector is that the customers probably use the Internet extensively to gather information on a trip planned, while marketing of fish and packaging is probably to further extent dependent on long term customer relationships or in situ examination by the customer. It has been reported that higher percentage of Internet customers prefer eco-labelled products compared to customers that shop in the stores (Björkman, 2000). And Matthews & Lave (2003) state that it can be seen in the tourism sector that eco-work gives market advantage as eco-tourism products and green and ethical investment products address fast-growing segments of the tourism industry and also on financial services market.

Conclusion

As a stand-alone tool benchmarking tools for environmental purposes are appearing within the flora of environmental management tools. Furthermore as other environmental tools are considering adding a benchmarking system to their tools (Voluntary Initiatives for

Sustainable Tourism, 2002), environmental benchmarking is likely to become a regular tool for use both as a stand-alone tool and in conjunction with other tools.

The data needed for environmental benchmarking are increasingly becoming available both within companies and industries and within environmental tools like eco-labels. These data provide learning opportunities for the providers of these data, the companies. An opportunity to learn how to save; energy, raw materials and minimize production of waste, and concurrently how to lower costs. It is likely that the companies will in future ask for that possibility.

7.2 Recommendations

In this study no Nordic environmental benchmarking system for SMEs was found, but such initiatives were found from other regions of the world. Here it is recommended to start Nordic initiatives on development of a Nordic environmental benchmarking tool. A tool developed for the whole Nordic region, a tool that will take into account that the Nordic region is one market, and assist companies to save the environment, reduce costs and comply with laws and regulation in the whole Nordic region. Such an initiative could provide a tool that could further enhance the fast development of environmental benchmarking and also assist in further development of maintaining the Nordic leading position in environmental work.

When developing such a tool it is recommendable to develop a one common platform for benchmarking tools that could be adjusted to many sectors.

During development of such system it would be advisable to study the tools discussed in chapter 6 (Existing environmental benchmarking tools) in details and learn from the experiences gained in making those tools. Furthermore it is recommended to study the characterising factors for success for existing eco-labels, awards and self-commitments in the report Voluntary Initiatives for Sustainable Tourism, 2002. These characterising factors are high level of transparency, requirements (environmental and social), and recognition and preferably professional marketing (Voluntary Initiatives for Sustainable Tourism, 2002). Here below is given a vision on a sector specific tool for benchmarking environmental performance.

Benchmarking does not have to be costly as research has revealed that only a few indicators (2-4) in most cases are sufficient to measure environmental benchmarking. A screening level benchmarking can accomplish much of the goal quickly and cheaply (Matthews & Lave, 2003).

Vision of a sector specific tool for benchmarking environmental performance

Such system would have to be reliable, effective and trustworthy, based on solid scientific knowledge, yet it has to be easy to use and understand.

Such system would thus have to fulfil several requirements, on Eco-efficiency, Comparability of data, User interface, Easiness of use and Confidentiality. It would be

Such as;

- Be based on Eco-efficiency approach,
- Be based in common systems approach within a given sector to make data as comparable as possible
- Easy to use
- Transparent without giving access to confidential information.

Eco-efficiency

The work performed has to give true improvement of environmental performance, efficiency per unit effort.

The system would have to define a common set of indicators. The indicators must be of relevance to the important environmental aspects and thus to environmental performance in the sector. Indicators should be chosen using best available information on the environmental issues of the industry.

Meaningful and reliable advices have to be given on improvements, with links to further information for further study.

Comparability of data

It is necessary to be able to compare data between time intervals within a company, also between companies and even between products. Data would have to be comparable. Thus system boundaries, data collection and analysis would have to be set in a common manner. This can be achieved through a common data format and a common system for gathering data from companies.

User interface

The system would have to present data in a meaningful and easily comparable manner. The results should be graphical information on where the company stands in comparison to other comparable companies within the sector. At the same time confidentiality has to be preserved.

Ease of use

This requirement interacts with other requirements. The suggested tool should be easy to use and not require special knowledge or skills in environmental or computer sciences of the user.

- It has to be easy to decide in which category the company belongs.
- It has to be easy to collect information.
- It has to be easy to compare the information with the information in the database.

The results must be easily understandable, preferably in a graphical manner. It has to be easy to detect the company's results from other results.

Preferably such system should also contain some humour, sayings and interesting eco-information to increase its user friendliness and esteem among users.

Confidentiality

Confidentiality must be between users and providers of the system. The users must be able to trust that confidential information of relevance in competition is safe from their competitors.

Furthermore they have to trust that the data they are benchmarking against are trustworthy data. This can be dealt with by trusting the companies for sending in trustworthy data or by making checks among the best performers followed by honours to best performers and something else for those that are definitely cheating. A simplified third auditing system is recommended.

Web based tool

A web-based tool is, if cared for, always up to date and gives immediate results and response. The Internet is the right base for a benchmarking tool for SMEs. The proposed tool should preferably be interactive and possibly work with handheld devices like mobiles. It should; help companies to start up, provide information about how to perform, present a system for gathering data, make automatic analysis when data are available and then give automatic

results on line. A helpline should also be provided. When data have been uploaded, the new information should be added to benchmarking system with other organisations.

Cooperation with branch organisation and or existing eco-tools

An environmental benchmarking system should be a task for Nordic SME industry associations; they may however lack the vision and knowledge to strive for such system on their own. They are however essential participants in such a task and could possibility be encouraged to be responsible for running such tool for their clients.

Cooperation with existing eco-tools

Environmental benchmarking tool could be evolved in cooperation with existing eco-tools, like eco-labels or even preferably with other environmental benchmarking systems existent outside the Nordic countries, some of the Flemish systems discussed here before or possible in cooperation with the European Tour-Bench tool. Within the Nordic countries it would be possible to cooperate with for example the Nordic Swan and the Miljøfyrtårn.

The existing Nordic eco-labels and EMS systems are however neither web based nor worked out to be interactive and furthermore they do not benchmark enterprises in this way. The system proposed would be much easier than the Swan, but evolving an easy Swan with integration of benchmarking tools could also be a possibility, if the label would be interested.

A vision on a further development of a web based benchmarking tool

Such system could, if successful, evolve further to include other key figures, for example for social performance and economical performance and thus become a sustainability index. It could include requirements of laws and regulation. It could furthermore evolve a draft of one page report on environmental performance that could be used for business performance. It would however be advisable to require some verification on actual performance from an accountant.

Thus such system could be evolved further to serve the triple bottom line. Possibly it would be wise to start with developing such system around the environmental factors and add the social and economical issues and possibility of environmental reporting or a kind of declaration in later versions of the system.

A vision on how start up phase of such system could be for a company.

1. Once a company has registered it would choose which sector to benchmark with, usually it would be the sector that the company is working in, but it is also possible to benchmark with other sectors.

2. The user could choose to perform a few minutes introduction to environmental auditing.

3. Then user would receive information on the most important key figures that the company should collect. It would be recommended to use (2-4) key figures on environmental factors and be asked for 1-2 figures on numbers of produced products or staff.

4. The system should support collection of data in the company, have inbuilt green accounting measurements.

5. Once registered, the figures are fed into a web based database.

6. The data are processed and compared with data already present in the database and the user gets results in figurative language along with hard statistical results.

7. The user is offered information on 3-5 useful advices on how to improve performance for each key figure. The advices are short and precise. If the user is interested in the advices there are links to more available information. The user can use a tool to calculate return of investment, if he decides to go into costly improvements.

8. Data are kept in the database and next time the user enters figures it can benchmark its result with its previous results.

9. Based on the results from the benchmarking the company can decide to join an eco-label system. Actually if its performance is better than average it should be encouraged to do so. The process of entering the eco-label should include verification of the actual performance. The eco-label should give different labels according to performance. The best performers should get gold awards, the second best silver and so on.

A summary of the “visionary tool” !

The tool is based on reliable and scientifically solid information of the main environmental impacts and aspects. Based on this information environmental key figures are worked out and these are the foundation of well structured management benchmarking system. The system is eco-efficient and easy to use.

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