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Communication of product related environmental information

User requirement studies of Environmental Product Declaration, EPD, systems

Report from
the NIMBUS project

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Summary

One important part of the NIMBUS project has been to gather experiences from and information about how environmental product information is used in the business to business communication in the Nordic countries. The project was carried out by dr.echon Cecilia Solér from Gothenburg Research Institute, in co-operation with Centre for Environmental Systems Analyses at Chalmers.

The methodology that was used in the project was to carry out focus group meetings with representatives from industries and authorities in Denmark, Sweden and Norway, with open talks around the theme of environmental product information. The second approach was to use in-depth interviews with representatives from marketing, purchasing and environmental departments in companies and public sectors along three product value chains. Together, this gave the basis for making the following main conclusions and recommendations from the study.

Declarations of contents providing information on the chemicals content of products are to be mandatory in a common Nordic EPD system. There is support for this suggestion in recent literature in the field. (Naturvårdsverket 1999; Jönsson 2000).

It is important to close the gap between the supply and demand of environmental information. The mismatch between the kind of environmental information producer's supply and the information corporate customers need(Jönsson 2000) is represented in this study as differences in how senders and receivers understand environmental information. Within a common Nordic EPD system efforts must be made to overcome this problem by;

a. investing in information activities aiming at bringing corporate customers/receivers closer to the position of producers/senders, and
b. investing in describing the information needs of corporate customers/receivers before formulating product/sector specific requirements, aiming at bringing producers/senders closer to the position of receivers.

Information activities within a common Nordic EPD system should have the purpose of educate users about the system as such, as well as about LCA methodology and use. Information about the system includes the spreading of knowledge concerning aims of the system, procedures, certification, trustworthiness, possibilities to influence the system etc. It includes a description of the subjective elements of EPDs. Information about LCAs includes simplified descriptions of parameters and environmental impact categories in relation to effects on health and the environment. It also includes descriptions how to use an EPD for the purpose of comparing the environmental performance of alternative products, (which is built on the assumption that average values or threshold values are included in EPDs). The information suggested here should provide users with enough knowledge to answer the questions; What is an EPD? What does EPD related information mean?

Information activities should preferably be the responsibility of a Nordic counterpart to Swedish Environmental management Council. Information activities should be more active than merely updated information on the Internet. Information packages for specific groups, i e salespeople are recommended, as well as instruction packages for key users responsible for EPD information.

The description of customer information needs should aim at systematically mapping out the kind of information customers within given industries require in order to use EPDs for comparative purposes. There exist within the Swedish EPD system some activities (stakeholder

meetings) aiming at the establishment of support of different actors before the adoption of PSR, product specific requirements (Miljöstyrningsrådet 1999). Within a common Nordic EPD system it is recommended that IND, information need descriptions are made mandatory as a preparatory step before the establishment of PSR. These IND should aim at collecting data from different groups of customers representing public interest, the business community, different organisational size etc. Such systematic descriptions will be a safeguard against the risk that only the opinions of a number of big and environmentally concerned customers are reflected in the PSR and the format of sector specific EPDs. INDs will increase the probability for EPDs to be a useful and efficient tool *promoting more ecoeffective products* and *services* as stated in the aim of the Nimbus project.

The possibility for users to compare the environmental performance of products and services on the basis of EPD information must be facilitated. In order to facilitate comparisons the EPD format must be made as user friendly as possible. Except for the inclusion of declaration of contents (which is discussed above) this means that;

a. Average values for specific product groups in relation to different environmental impact categories/parameters and/or threshold values, visualised if possible, are included in EPDs.
b. Clarification/visualisation of the relativity of environmental performance in relation to phases of the life cycle are included in EPDs.
c. A common layout format should be established with sector specific possibilities to make company specific comments of a subjective character under separate headings or in appendices.

The formatpresented in the main report of the Nimbus project to a large extent corresponds to the recommendations concerning a common layout format and the clarification/visualisation of the relativity of environmental performance in relation to phases of the life cycle. The four-page format provides room for visualised information, the headings are clearer, and easy-to-find, than those found in Swedish certified EPDs.

The Nordic Industrial Fund, participating companies and Federations of Industries in Norway, Sweden and Denmark have financed the NIMBUS project. The project has also been co-financed by other ongoing national and international activities.

Content of the report

1. Background

This study is a part of the Nordic Project for Implementation of Type III Environmental Product Declarations in the Business Sector (NIMBUS project). The main aim of the project is to promote *more ecoeffective products* and *services* in the Nordic industry through implementation, testing and further development of a common Nordic system for Environmental Product Declarations (EPD) based on ISO 14040-43 standards. The term eco-effective includes environmental as well as economic effectiveness and efficiency. It is a primary goal to prepare Nordic industries on increased environmental competition internationally. The project will focus on *business to business* use of EPDs since this is a presumption for other types of EPDs, e.g. business to consumer EPDs.

Considering that Sweden already has a system for EPDs in operation, and that case studies on a test basis already have been carried out, the Swedish research part of the project was focused on communication aspects, i.e. activity II.1, *User requirement studies*. Among the industry partners of CPM there is now a growing demand for additional research on communication of EPDs. The communication study has been performed by GRI, Gothenburg Research Institute at the Business School at Göteborg University, acting as a sub-contractor to CPM.

Within the communication study the main aim of the Nimbus project to promote *more ecoeffective products* and *services* (in the Nordic industry through implementation, testing and further development of a common Nordic system for Environmental Product Declarations (EPD) based on ISO 14040-43 standards) is viewed from the user perspective. This is emphasised by one of the stated sub-purposes in Nimbus;
- Present user friendly formats and instructions for use of generic and sector specific EPD systems.

The communication study focuses on *business to business* use of EPDs. The general focus on business to business in combination with a user perspective has lead to the formulation of the aim described below. . A CPM project was initiated in connection to the communication study. The participating industry partners have provided input to the study as such by formulating key questions, discussing the selection of interview persons etc, and by participating in the Swedish focus group interview. They have also made it possible to interview several persons in a number of companies, both companies of their own as well as their customers.

The concept EPD related information is frequently used below. Due to a general lack of comprehensive use of the Swedish EPD system, which is the only system already in use, EPD related information is a more suitable concept. EPD related information is defined as **quantitative LCA-based environmental product information.** Thus by using this concept all experiences of using and communicating the type of information that is the very base of a future EPD system will be included in the study. Other concepts frequently used here are type I, type II and type III referring to different types of environmental information systems. Type I refers to third party verified eco-labelling as "The White Swan". Type II refers to self –declarations and type III to "quantified environmental life-cycle product information, provided by a supplier, based on independent verification, (e.g. third party), (critically reviewed) systematic data, presented as a set of categories of parameters (for a sector group)" (ISO/TC 207/SC3). EPDs or EPD related information is sometimes referred to by interview persons as type III environmental information.

2. Aim of study

1. To describe the crucial aspects of communicating EPD systems both within and between organisations,
2. To make recommendations about how to facilitate an understanding for, and effective use of, EPD systems.

In order to fulfil this aim a dual focus was maintained throughout the study;
1. The different users understanding for, or interpretation of, EPD systems was described.
2.The flow of communication in relation to EPD systems was described. Who communicates with who about what, i e information flows and actors in the communication chain concerning EPD were mapped out.

3. Collection of data

The collection of data has been a stepwise procedure. First focus group interviews were conducted, one in each participating country, aiming at covering the breadth of the problem area and describing similarities and differences concerning the overall view on the communication and use of EPD related information. Secondly personal interviews with key persons in selected Swedish companies/organisations were conducted. These personal interviews were conducted with the purpose of exploring the problem in depth both on the level of describing individual actors' interpretation of EPD related information as well as describing information flows. Sweden already has a formal EPD system in use and some declarations are developed by a number of companies. This was the reason for interviewing representatives for Swedish companies and organisations that are more experienced when it comes to the actual use and communication of EPD related information.

This procedure of conducting both focus group interviews and personal interviews has been a source of validation for the entire study. Both types of interviews have been conducted from a phenomenological perspective. For the personal interview part this means that qualitative variation in how EPD related information is perceived and communicated is in focus. Thus the variation in perspective in relation to EPD systems is the object of study. Morgan (Morgan 1993) provides arguments for the combination of focus group interviews and qualitative phenomenological personal interviews. The focus group allows a variation of perspectives to be revealed. Within this study the focus group interviews stimulated ideas concerning the communication of quantitative LCA-based environmental information as well as identifying symbols and use of language related to this kind of environmental information. Important areas of inquiry and interpretation vis-à-vis the personal interviews were identified this way.

3.1 Focus group interviews

The focus group interviews were conducted with the purpose of identifying and describing as many communication relevant aspects of using EPD systems as possible. The focus group interview is an approx. two-hour group interview with 8-12 participants. Questions were prepared and distributed as an interview guideline to the participants in advance (see appendix 1). A moderator (Cecilia Solér with the assistance of Mie Vold and Jakob Zeuten in the Norwegian and the Danish group interviews respectively) were present and responsible for probing and keeping the focus along the discussions.

The focus group interview is a method that permits conclusions on a common-sense basis (Nordiska Ministerrådet 1999). When analysing statements made in a focus group interview it is possible to discern;
- Phenomena/way of thinking existing in the population
- The frequency of the phenomenon
- The combination of phenomena/way of thinking
-Differences between groups.
In this context, phenomena should be understood as different areas where EPDs are used. Ways of thinking applies to the different meanings EPDs assume within a given area.

The focus group interview thus is an excellent method to answer one central question within this project "Are there any substantial differences between the three countries concerning way of thinking about EPD systems?" Morgan (Morgan 1993) describes the purpose of the phenomenological focus group interview as "determine meanings on another level beyond one-to-one". Schatzman & Strauss in Morgan (1993) discuss the use of focus group interviews from a phenomenological perspective.

"..this form of information gathering provides an especially nice situation for revealing variations in perspective and attitude and a ready means, through subtle pitting of one against the other, for distinguishing between shared and variable perspectives."

All participants in the three focus groups work in companies producing EPD related information. Thus the participants have been characterised as senders of environmental information.
As the aim of this kind of interview were to maximise different kinds of experiences of the communication of EPD related information. Participating companies were informed about the importance of both technical and communication oriented competencies in discussions about communication of EPD systems. In some cases Swedish companies were represented by both a technical and a communication oriented person. In Norway and Denmark there were one representative from each company.

The focus group interviews were taped and transcribed. The Norwegian and Danish interviews were transcribed locally in order to minimise errors and faults due to language.

3.2 Personal interviews

The second step in the collection of data was to conduct personal interviews with representatives from selected companies/organisations. This second step aimed at describing both "real" flows of communication concerning EPD related information and how the actors interpreted information. Two criteria for selecting interview persons were;
1. To select interview persons that have experience in using and communicating EPD related information.
2. To achieve a variation in the type of organisations represented by the interview persons.

Three companies among the companies participating in the CPM EPD communication project, and their customers, were selected for the personal interviews. The customers represent purchasing processes within both business and public sector. The selection of interview persons was based on a wish to cover different competencies using and communicating EPD-related information in each company included in the study. Representatives from top management and other departments are defined in the following manner;

Top management – the person within the executive group that has the most knowledge about the use of EPD systems in practice and daily activities.
Environmental dept.- the person within the environmental dept that is most experienced and knowledgeable concerning the use of EPD related information in practice.
Purchasing dept.- the person within the purchasing dept that is most experienced and skilful concerning the use of communication of EPD related information
Market dept.- the person within the market dept. that is most experienced and skilful concerning the use of communication of EPD related information.

The following numbers of persons within each type of organisation, representing different competencies, were interviewed.

1. Producer of capital goods
- long-lived product
- interview with four persons
(top management, environmental dept., purchasing dept., marketing dept.)

Customer, building/housing firm
- interviews with three customers
(environmental dept.)

2. Producer of electric power
- interview with three persons
(top management, environmental dept., marketing dept.)

Customer, local electric power company
- interviews with two customers
(top management and marketing dept.)

3. Producer of hygiene products
- short-lived product
- interview with four persons
(top management, environmental dept., purchasing dept., marketing dept.)

Customer, public purchasing
- interviews with two persons
responsible for regional public purchase
(environmental dept., and financial dept.

The personal interviews conducted within this study are qualitative and can be described as reflecting a phenomenological perspective, This means that the interview persons' experiences of the communication of EPD related information will constantly be in focus. Phenomenological interviewing, or phenomenography, is a suitable method that focuses on variations in individual experiences of phenomena. Thus the experiences of each IP (interview person) concerning communication and use of EPD related information was the point of departure for each interview. Very often communication and use of EPD related information is closely linked to opinions about other types of environmental information (type I and type II). Therefore, the point of departure for the interviews has been the general question "What kind of environmental information do you use in your work?". Questions were prepared and distributed as an interview guideline to the participants in advance (see appendix 2).

4. Results

4.1 Focus group interviews

Three focus group interviews were conducted within the project, one in Sweden, one in Norway and one in Denmark. The aim was to identify and describe as many communication relevant aspects of using EPD systems as possible. One central question for the focus group interviews to answer was" Are there any substantial differences between the three countries concerning way of thinking about EPD systems?"

In the invitation to the focus group interviews companies were encouraged to send, if possible, representatives being competent both within the technical area and the area of communication concerning LCA-based environmental information. For the Swedish interview this resulted in six out of twelve participants being involved in the communication of environmental information in general and to some degree in the communication of LCA-based information. The other participants in the Swedish focus group work in environmental departments and some of their main tasks are ISO 14000, the development of LCAs, product development and environmental information on a general level. The Swedish participants represent the following industries; automotive, energy, cement, forestry/pulp and paper, flooring, domestic appliances, hygiene products/medical articles.

In the Norwegian focus group three out of four company representatives work in research departments. They all work with environmental issues on a general level as well as LCA related projects. They represent both technical and communication related competencies. The Norwegian representatives represent the following industries; oil, cement and plastic.

The participants in the Danish focus group work with environmental issues on a general level. They represent both technical and communication related competencies as their area of expertise range from EMAS and ISO 14000 to the development of LCA and communication of environmental information of different types. The Danish representatives represent the following industries; energy, plastic/medical articles and cables.

Sweden has a formal system with Environmental Product Declarations in operation since 1998. Thus, the participants in the Swedish focus group are more experienced in using and communicating quantitative LCA-based information than the participants in the Danish and Norwegian focus group. The results of the three focus groups vary in the sense that more concrete communication related examples were discussed in the Swedish interview.

The following presentation of results from the focus group interviews will principally follow main topics in the interview guideline (see appendix 1). Within this presentation results from each group/country will be clearly identifiable in order to facilitate comparisons between the three countries. The different views expressed within the focus group interviews will synonymously be referred to as opinions, views, and perspectives.
The empirical material does not allow any conclusions based on the number of people thinking in the same way. The manner of presentation below follows the aim of the project "to identify and describe as many communication relevant aspects of using EPD systems as possible". Within the focus group interviews this is achieved through a description of variations in perspective concerning EPD information.

4.1.1 Topic 1 – Use of environmental information in general

In order to discuss essential aspects of using and communicating LCA-based information this type of environmental information was related to other types of eco-labelling systems (type I e.g. "The White Swan" and type II self declared systems).
Sweden
The opinions in this group reflect a criticism towards type I systems ("the Nordic Swan" and "Bra Miljöval") on the one hand and a belief on the other hand that that type I systems are more trustworthy symbols than type III on the market. One unifying view wants to replace type I systems with verified type III declarations as symbols of environmental competence and trust.

When asked what kind of environmental information customers ask for, the answers provided show a picture of the typical business-to-business customer that asks for type I information, simple truths or guarantees that products are ecologically friendly. In specific industries there is a growing demand for information about product contents and composition. In the discussion about the external use of EPD related information however one perspective emerged that reflect quantitative information (LCA-based) to be important for certain "big" customers who might want to use this kind of information in calculations of their own.
The essence of the dichotomy small customers asking for type I and big actors asking for type III is further problematized by the following citation;

" ...this product (product labelled with EPD) has been sold to customers we didn't expect, that kind of customers who will not find it useful, only.....well yes I suppose they have estimated the value of it in some way, but they have estimated its value in relation to the strength of their trademark"

The participants reflect opinions about type I systems being too costly and built on no scientific ground. There are voices viewing EPD information as more trustworthy as it's verified, i e potential receivers are guaranteed that someone knowledgeable has checked the information and the calculations. EPD information is considered a tool for assessing environmental risks that can contribute to raise the level of environmental competence among those who deal with environmental information. Also EPD information is seen as discriminating between alternative products to a higher degree as the "White Swan" is only available to a limited number of products within each product group

Norway

Norwegian participants reflect opinions that are critical towards type I systems. In the case the "White Swan" is an option, this type of environmental information is regarded as an unfair valuation of environmental performance. Parameters on which the valuations of the environmental performance of specific products are built are considered subjective and political in nature. There is a view seeing "White Swan" criteria as non-scientific. EPD related information on the other hand is viewed as fair and relevant as the entire life cycle is included. This information being quantitative in nature enables the customer him/herself to draw conclusions or judge the environmental performance of specific products. As an example described in the discussions EPD related information can provide a fair and objective picture of the relation between recycling, reuse and transformation to energy. One perspective on EPD related information suggests that type III is superior to type I information as it discriminates better between alternative products. The "White Swan" is only available to a limited number of products within each product group. Both within groups of products labelled with the "White Swan" as well as between groups of products labelled and not labelled important environmental parameters may vary.

According to the participants there is little demand for EPD information in Norway. When asked what kind of environmental information customers ask for, the answers provided show a picture of customers mostly interested in EMAS and ISO 14000 (type I systems are not included in the answers to this question which can partly be explained by the fact that type I is not an option for the majority of industries represented in the focus group).

There is one perspective reflecting the importance of environmental information in combination with information about health, safety and toxicity. This is the kind of information the participants in question disseminate, or plan to disseminate. Thus it is plausible that there exist in Norway, at least in some industries, a demand for information about product contents with focus on substances hazardous to health.

Denmark
The opinions in this group reflect a criticism towards type I systems ("the Nordic Swan" and "Bra Miljöval") based on costs that are considered too high and business like forms ("det er regulaer smart business"). Another perspective in the discussion acknowledge type I systems to be more market-oriented in the sense that it is regarded as a more efficient kind of environmental information in the sales process. When asked what kind of environmental information customers ask for, the answer is type I in the industries where this kind of environmental information is optional. Other answers to this question indicate the demand for information about chemicals as PVC and phatalates linked to specific products.

Views about EPD related information as the best guideline to products' environmental performance (most comprehensive) and as concrete quantitative indicator of environmental performance are found in this group.

One perspective on type I systems expressed in the discussion points to the fact that the implicit assumption about this kind of information to be more easy to use on the market (than type III information) can be problematized:

" one of the reasons behind the difficulties of type I systems is their differing requirements (criteria). This means that when we can deliver an eco-labelled product
we have to spend a couple of hours explaining what eco-label do we deliver, on what criteria is it based etc".

4.1.2 Topic 2 – Internal use/communication of quantitative LCA-based environmental information/EPD related information

Sweden
One important field of application for EPD related information is the determination of hot spots, i e areas of importance for the environmental performance of specific products. According to one central perspective hot spots are indicators of which life cycle phase is most important to products' environmental performance (i e the user phase, the production phase etc). Thus in this sense EPD related information is viewed as a product development tool indicating areas where environmental improvement is needed. EPD related information is by some viewed as marketing arguments providing data about the relative importance of each life cycle phase. As an example in the case of household appliances the use of energy in the production phase is documented to be marginal in relation to the use of energy in the user phase, which in itself can be used in the promotion of energy-saving products. Some participants view EPD related information as an important part of personnel training providing (sales) personnel with (market) arguments about the relative environmental importance of different life cycle phases for products or product groups. EPD related information is also used in process optimisation.

From one perspective EPD related information has resulted in a higher level of perceived security in the sense that environmental performance can be calculated. Thus EPD related information is more easily accepted by engineers (than other types of environmental information). From other viewpoints the inherent difficulties of describing a biological system or health aspects in terms of numbers and calculations is emphasised. The need to scrutinise products and processes regarding hazardous substances was ventilated in the discussion.

When asked, "what does this type of information mean to different departments?" product development and R&D are the departments mentioned. An additional parameter, the environment, is added to R&D work and product development. EPD information is used to compare concepts, material choice and subcontractors. It was also mentioned that LCA results

have been used in process development by providing arguments for investments. The use of EPD related information in product development and R&D is however not unproblematic. The priority of environmental concerns in relation to function and price is unclear which might neutralise the existence of EPD related information in product development and R& D work. Judging from the answers to this question, and from the discussion about external use below, marketing and purchasing departments have been affected only marginally by the introduction of EPDs.

The opinions reflected in the discussion reflect that salespersons and employees at marketing departments need to be trained in order to understand and eventually use, concepts as GWP (Global Warming Potential) and AP (Acidification Potential). In one of the represented companies this is done by translating emissions into monetary terms. The following citation illustrates the inherent paradox of transforming EPD related information into a commercial language.

" This study is about the problem of getting marketing people and salespeople to understand this technical information. In reality, technicians and salespeople and marketing persons have different preferences. As a technician you want the information to be understandable and easy to read, as a marketing or sales person you want information that your customers can understand and that you can use in the marketing of your products.....I've been training our salespeople for many years, talking environmental adjustment and AOX (adsorbable organic halogens) and COD (chemical oxygen demand), at least three or four times. Still most salespersons have difficulties explaining what AOX stands for, they almost understand it but they find it hard to say. Eventually when they have to explain this to the customer we have a problem, because she/he finds it even more difficult to understand."

The problem of different (environmental) focus in different countries was mentioned in the discussion. Some differences were related to different levels of knowledge, others were related to the emphasis of different environmental problems

Norway

One field of application for EPD related information referred to is the determination of hot spots, i e important areas of environmental influence both on a general level for specific products. Other areas for use are product development, benchmarking activities, strategy formulation and a tool to increase the environmental awareness on a general level.

According to voices in the discussion EPD related information need to be marketed internally, salespersons need to be trained in order to provide them with knowledge about the scope of an LCA and how it is set up. The perceived present uncertainty regarding the LCA methodology is seen as problematic by one participant, as the data can be misused and misinterpreted.

Denmark

One field of application for EPD related information referred to is the determination of hot spots, i.e. important areas of environmental influence. Another central field of application for EPD related information is process optimisation. EPD information is seen as a tool for environmental adjustment, important areas of use reflected in the discussion are product development, evaluation of subcontractors and raw materials. According to one central perspective EPD related information is something new in Denmark, not yet used systematically. Rather it is used to answer specific questions in specific projects and situations.

4.1.3 Topic 3 – External use/communication of quantitative LCA-based environmental information/EPD related information

Sweden

According to some voices in the discussion EPD related information is an instrument creating goodwill. Examples of goodwill creation mentioned by participants are that the image of the environmentally engaged company is strengthened by its use of EPD related information and that

customers are believed to feel more safe regarding the environmental concern of their counterpart. Other examples of goodwill creation mentioned are the availability of good environmental information in the communication with authorities, certificators (EMAS, ISO 14001) and customers (an alternative to the filling in of forms answering environmentally related questions) and the environmental reputation of the company in the recruitment process.

The discussion showed that EPD related information is used in market communication. One perspective emphasises its use when communicating the relative environmental importance of a product's different life cycle phases. As described above quantitative information (LCA-based) is more important for certain "big" customers who might want to use this kind of information in calculations of their own. The discussion clearly indicates that the work of marketing people hasn't changed due to EPD systems. Neither have the customers' purchasing function. The participants exemplify this:
-Purchasers are believed to ask some environmentally related questions which they do not understand. Thus in the market communication process EPD related information is regarded as an additional sales argument, not as a means for establishing deep environmental comprehension.
-EPD related information is something "you must have", it is perceived to be regarded as a guarantee that company is environmentally aware.
-Generally LCAs are seldom penetrated, details are overlooked except in the case when "big" customers have an interest in LCAs as an input in their own calculations.
- In the case the customer is interested in the details of EPD related information, marketing people are assisted by someone from the environmental department.
- EPD related information is communicated internally in process optimisation, externally solely the existence of EPD is interesting.

Two perspectives emerged in the discussion about the need to educate customers as well as marketing personnel about the scope and meaning of EPDs. As mentioned above one perspective see marketing people and top management in need of this LCA knowledge. (From another perspective, partly logically related to the former, it is not possible to try to make customers understand LCAs since this kind of environmental information is regarded as too complex Instead the customer needs trust in the EPD system. Thus it is important for companies to act in a way that create confidence regarding EPD information as a guarantee for improvment of environmental performance.

Norway

In the discussion one picture of LCA based information as a possibility to create goodwill on the market emerged. This kind of environmental information can be seen as an assurance that companies deal with problems associated to the life cycle perspective. Hereby it shows that the environmental awareness of the company includes the entire life cycle of products. One example of external use is the company salespersons using LCA information in recycling projects in co-operation with customers. Another example are co-operative LCA projects initiated by a company having in-house LCA expertise in order to minimise the risk of misinterpretation of LCA data in customer LCA calculations.

The level of LCA related knowledge in Norway is judged to be lower than in Sweden. LCA based information is principally an interest of LCA experts who work with this kind of environmental information themselves. Some use the LCA data in their own calculations, others might only want to know if environmental issues are dealt with from a life cycle perspective. Thus we can conclude that the work of marketing people probably hasn't changed due to the introduction of LCA based information. Another group having an interest in LCA data exemplified in the discussion is technical personnel in the building industry. The level of

understanding of LCA among purchasers and technical personnel is judged to be low according to one perspective. Thus it is not possible for purchasers to value and weigh LCA based information. Purchasers need education in order to understand the meaning of different parameters.

Denmark

Also in the Danish discussion the goodwill dimension of EPD related information is ventilated. EPD related information is seen from one perspective as an environmental guarantee showing that companies handle environmental problems in an orderly way, e.g. no unnecessary pollution is accepted. EPD related information is, according to voices in the interview, used externally in order to show in what lifecycle phase the environmental influence of products' is important. Thus this kind of environmental information provides marketing and sales persons with environmental arguments. One example is the condensation of LCA results into a résumé aimed for the market where only results perceived to be relevant for in market communication are included. From another, partly parallel perspective EPD related information is seen as an educational instrument making customers see the extent of environmental performance, i.e. to realise that the environmental dimension is more than non-existence of PVC and other environmentally doubtful substances. However customers are believed to be ignorant concerning the possibility to demand and receive EPD related information.

According to one central perspective customers are believed to have difficulties understanding EPD related information. Instead one view on environmental information is that it should be simple and clear-cut . Comparisons between products on the base of EPD related information are believed to be difficult. The discussion reflect a view on professional buyers having as big difficulties in understanding EPD related information as unprofessional buyers due to time pressure. Instead the potential receiver of EPD related information is the environmentally concerned buyer. According to one voice in the discussion type I information is suitable for consumers whilst the target group for EPD related information is the professional purchaser. From this horizon EPD related information can contribute to purchasers' decision making by defining hot spots related to specific products.

4.1.4 Topic 4 – Readability and trustworthiness of quantitative LCA-based environmental information/EPD related information

Sweden

The Swedish participants regard the certification of EPDs as central to the trustworthiness of the EPD system. The importance of the certification is, from one viewpoint, industry related. This statement is supported by another voice proposing that early certification (in relation to other companies in the industry) increases the goodwill of having an EPD. According to one participant the certification process can be a way to supply the customer with the kind of information he/she wants:

" the customers demand more and more information about the composition of products, they want information on a very deep level, even the formula.....and that you cannot give them. We have to find a way to solve this, can certified EPDs be one way to proceed, to get a third party verification of product content in order to raise the confidence among those who buy the product."

In the discussion about certification one voice advocated a cheaper and quicker certification process. This is especially important for companies producing a large number of products. Another voice pointed out the inherent uncertainties of the EPD system due to the unreliability of data.

A common layout standard is seen as an important ingredient in a Nordic EPD system. Such a common layout is believed to facilitate the reading and understanding of this kind of environmental information given that the present level of understanding is low. Promotional texts should not be a part of an EPD according to the participants. However more market-oriented texts should be allowed according to one viewpoint in the non-verified parts of an EPD, and according to another as an appendice to the EPD.

The possibility to add up data is regarded as important by the participants.

Norway

The Norwegian participants regard third party verification of EPDs as important. This verification could be certification of EPDs or verification by trustworthy institutions or persons. However, the certification of EPDs is not yet regarded as having major importance for the acceptance and trust of/in EPD information.

A common layout standard is seen as an important ingredient in a Nordic EPD system. Such a common layout is believed to facilitate the learning associated with EPDs as well as the possibilities to use this kind of environmental information.

In the discussion about promotional texts/marketing one proposal emerged that such information should be placed under a heading indicating subjectivity and company specific information. Another voice proposed that LCA should bee recognised as marketing in itself. One perspective reflected the importance of company recognition within an EPD (logo, name etc).

The possibility to add up data is regarded as important by the participants.

Denmark

The Danish discussion about certification reflects several partly contradictory perspectives. One is that some type of external control of EPD information is necessary in order for the system to be trustworthy. From another perspective certification should be voluntary, i.e. a possibility rather than a compulsory ingredient of an EPD system. The opinion that EPDs mustn't be certified from the beginning is in line with this reasoning. This line of thought is also supported by a voice saying that the system probably will not be regarded as more trustworthy due to certification. A proposed alternative to certification is the documentation of data sources and handling. In the discussion about certification a central issue was "what is provided by certification?" and "what is managed more properly by an accredited certificator than by a non-accredited certificator?"

One voice in favour of certification emphasised that certification should deal only with the calculations and data, i.e. not regulating what is and should be communicated. Another voice in the discussion pointed out the immense task of certifying great numbers of products. In order to do this requirements must be kept on a low level.

The discussion about promotional parts within an EPD showed that it is regarded as important that companies have possibilities to inform about relevant activities. It should be evident from the layout what information is standardised and what information is company-specific. According to one participant the judgement of what should be included under specific headings is a part of the certification.

The possibility to add up data is regarded as important by the participants.

4.1.5 Summary and conclusions from the focus group interviews

The presentation of the results from the focus groups indicate no major differences between senders of EPD related information in the three countries. Thus the answer to the question "Are there any substantial differences between the three countries concerning way of thinking about EPD systems?" is negative. There exist, however, a few variations regarding the perceived importance of certification as well as the perceived use of EPDs in market communications. Comparisons between the three countries have sometimes been difficult due to overrepresentation of concrete examples of communication related situations in the Swedish interview. As there is an already established EPD system in operation in Sweden the knowledge of, and experience in, EPD information in Sweden is, as the discussions indicate, higher.

In all three countries, type III (EPDs) information is regarded as superior to type I information. The typical image of the "Nordic Swan" is that the system is too costly, subjective/political as criteria are perceived as arbitrary, and unfair as it doesn't discriminate in an efficient manner between products.
EPD information on the other hand is seen as more trustworthy and fair as it is built on scientific ground, and as it is verified and quantitative in nature. There is however a greater demand for type I information, than EPD information, in Sweden, Denmark and Norway. The discussions also clearly showed that there is a market demand for information about substances hazardous to health and environment. The participants acknowledge the market potential of what they regard to be simplistic environmental information (type I). A major challenge perceived by the majority of participants in the three countries is to learn the customer what EPD information stands for as a complement to a focus on hazardous substances and an alternative to type I information.

EPD related information is used for the identification of hot spots in the three countries. Important fields of application are product development and process optimisation. EPD related information is also regarded as an important tool to raise the level of environmental awareness in organisations. The use of EPD related information results in a need for training both among personnel and customers regarding what EPD s stand for and how they are used.
EPD information is perceived to create goodwill on the market. The existence of EPD information strengthens the image of an environmentally concerned company that handles environmental problems in a correct manner. The market department and the purchasing function within companies has not been affected by EPD related information. This is partly due to the limited demand of this kind of environmental information. It can also be explained by the level of understanding for EPDs by customers and marketing or salespersons alike. If EPDs are communicated to the market they are often used as indicators of the relevance of different phases of products' life cycle. In the Danish focus group a more market-oriented view on EPD related information can be distinguished. EPDs are, to a greater extent, seen as marketing instruments than in Norway and Sweden. This is exemplified by a view reflected in the Danish discussion about certification. Here certification is seen as the control of calculations only, what in the EPD that is communicated to the market should be for the individual company to decide.

In the Swedish and Norwegian group discussion certification of EPDs was regarded as important for the trustworthiness of an EPD system. The Danish discussants represented a less unified view on the value of certification. Overall it was emphasised that the certification of EPDs shouldn't be too costly and bureaucratic (as the Swedish certification process). Relatively cheap and quick certification was seen as essential for an EPD system claiming to cover large parts of the market.

Opinions about inclusion of company specific environmental information within the framework of an EPD are similar among the three countries. The individual company should have a possibility to provide the reader of an EPD with non-verified environmental information as an appendice or under separate headings.

A common layout standard is seen as important for a Nordic EPD system as well as the possibility to add up data.

4.2 Personal interviews

The personal interviews clearly show that EPD information in particular, and environmental information in general, is perceived in different ways. Depending on personal experience of environmental information, profession, type of industry and education interview persons feel a need for different types of environmental information in their work. From a phenomenological perspective this variation in interpretation of environmental information found among the interview persons can be described by using the metaphor of spectacles. As illustrated by figure 1 EPD information or environmental information in general is perceived individually by interview persons. Depending on *how* this type of information is perceived, i. e. what kinds of spectacles are used when perceiving the information, EPD information or environmental information in general *has different meanings* for the individual. Phenomenographically the individual interview person is related to environmental information through the meaning this information has for him/her.

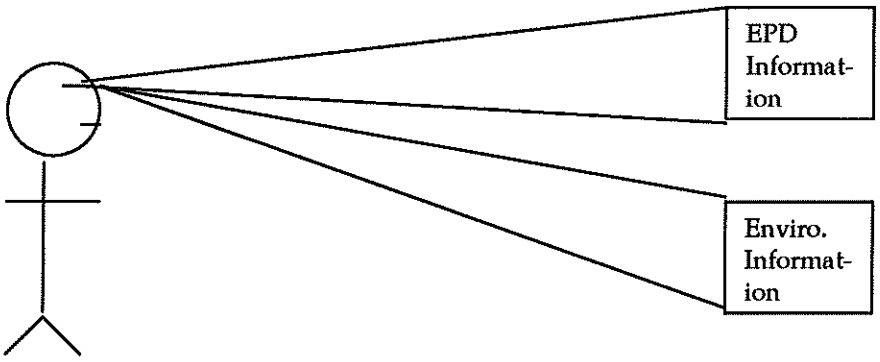

Figure 1. The relation of meaning between interview person and type of environmental information.

The results from the personal interviews are presented as perspectives, i e different ways of understanding EPD information in particular or environmental information in general. The main difficulty in the analytical work has been the absence of experience of EPD information among seven of the interview persons. Instead, the main topic when interviewing these people has been environmental information central for their work. When relating the perspectives to each other one must have in mind that the analysis of perspectives is but a momentary glimpse of how 18 professionals in three different industries/sectors perceive environmental information given their experience. The seemingly unbridgeable differences regarding essential environmental information can be interpreted as

1. reflecting differences in how specific industrial sectors have been environmentally exposed as well as
2. reflecting organisational shortcomings neutralising the dissemination of environmental awareness within organisations.

Out of the five perspectives presented below two perspectives relate to EPD information and three to environmental information in general. Background information on the interview persons as sender/receiver of environmental information and profession is summarised in figure 2. The dichotomy sender – receiver of environmental information is an indication of whether the interview persons mainly perform the task of sending or receiving environmental information as part of their profession. Figure 2 clearly tells us that in this study senders at producing companies have more experience in, and actively use EPD information than receivers related to purchasing in companies or organisations.

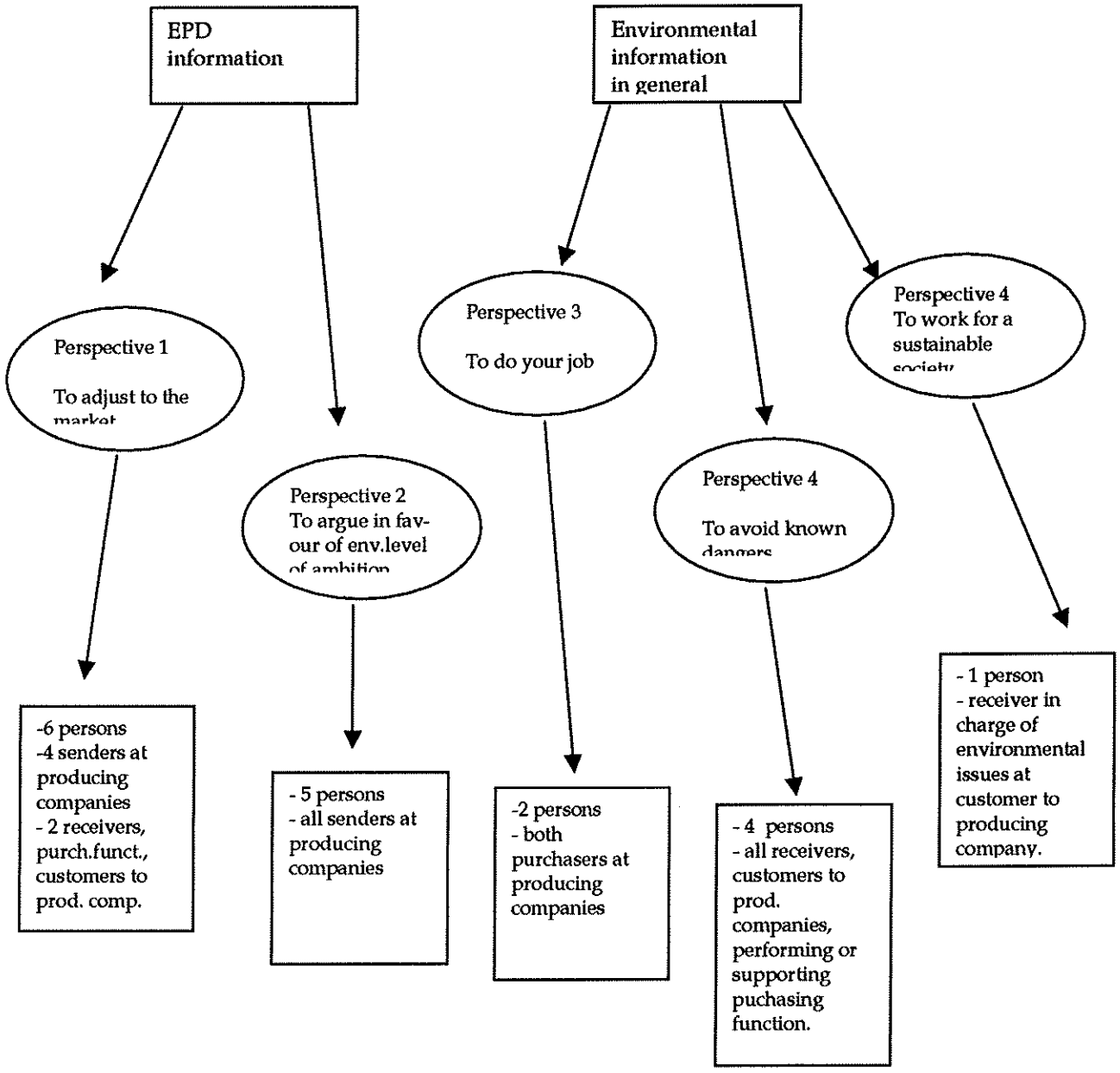

Figure 2. The representation of sender/receiver of environmental information industry wise in relation to the five perspectives.

Each perspective on EPD information or environmental information is characterised by a certain focus. This focus links the different aspects of environmental information to an individual logic.

For interview persons representing the same perspective all aspects are not equally important but they are embraced by the same logic.

4.2.1 Perspective 1 – To adjust to the market

Six persons represent this way of understanding EPD information. Four of them work at producing companies. They have been characterised as senders of environmental information. The additional two persons are primarily receivers of environmental information and they represent the clients of producing companies. The receivers representing this perspective are engaged in purchasing activities. They purchase one type of product, which can be characterised as a simple product when compared to the products purchased by receivers representing perspective 4 and 5.These persons work primarily with EPD information. When talking and thinking about EPDs they focus on *surplus value*. For them EPD information adds value to the product they sell or buy. Using EPD information is an act of market adjustment. Thus for this group of people the use and communication of EPD information means that;

They have a possibility to make money.
The focus of surplus value makes the moneymaking quality of EPD information evident. This aspect of EPDs is formulated in different ways among the people in this group. One producer charges more for products having an EPD and the possibility to earn money by providing EPDs is described in this interview:

" EPDs is one way to raise the awareness..... we want people to ask for EPDs because then we can sell it, we charge a little bit more for it because we have invested quite a lot to develop (EPDs) and of course then you want your clients to ask for it. An information package makes people interested, you create a need, it's the usual marketing procedure."

Other interview persons indicate that no extra money is hoped for but rather the keeping of market shares. EPD information is regarded as an indicator of high quality that might help fight low-price competition and keep a good environmental reputation.

" You are not supposed to speak about these matters commercially, but if we put it this way: If man chases pennies and some customer would refrain from doing so if he/she would get more quality maybe the focus on price would disappear...."

Many interview statements make clear the moneymaking possibility of EPDs.

" We can charge higher prices for it (product having an EPD) in Germany than in Sweden.....and my strategy is to concentrate more on Europe where we are better paid."

" ...we have experienced that in many cases we have been early and then someone else has made the money".

EPDs as a possibility to earn money is a reflection of how the needs of the market, concerning environmental information, are understood in this group..

They adjust to the needs of the market
By providing EPD information this group is adjusting to the need of the market to describe the environmental influence of products and activities. Thus the focus of surplus value is as formulated in this citation, customer value.

" EPD is customer value, that you know what you buy"

" Companies in some industries..... feel a pressure to define how they influence the environment and they are not interested in type I because it does not tell how they influence the environment"

This essential aspect of EPDs, to provide descriptions of environmental influence, is often related to Type I environmental information. Type I, as the ÒNordic Swan ÒorÓ Bra Miljöval is not regarded as alternatives in this sense. Type I is regarded as an environmental label providing no description of how the environment is influenced in relation to specific products or activities. Therefore EPDs are preferred when communicating environmental performance. By offering EPDs, companies are seen as subcontractors of environmental descriptions, which makes it possible for the client to compare the environmental performance of suppliers.

The trustworthiness of type 1 environmental information on the market is however not overlooked. To the extent that type I is used and communicated by the persons in this group Type I and EPDs are seen as directed to different target groups.

" As soon as there are individual consumers involved you have "Bra Miljöval". In business-to-business or when companies are using it in their internal environmental work you have EPD.....in principal you can say that companies producing consumer goods they demand Bra Miljöval more often which they use in their own marketing...."

The sometimes complimentary use of EPD information and Type I information emphasises the market oriented view of this group. One representative for a company communicating both types of environmental information answers in this way when asked, "What do you communicate when using type I and type III?"

" Basically I want to say that X is a good company because we are environmentally responsible and then I use different tools because there are different receivers, different target groups, but I want to communicate that company X is a good company or better in relation to other companies."

They have the possibility to offer a declaration of contents

The focus on surplus value found in this group indicate that EPDs are not only different in comparison to type I but offer something more than type I. As indicated above EPDs are perceived as giving customers the possibility to define or describe the environmental influence related to products and activities. For this group of people an EPD is a declaration of contents that describes the product and way of production.

" One could call it production specified X, I think that is a fairly good name, because the customer says that – I want 25 % Z and 25% Y, but I must have a environmental product declaration - then it's the manner of production that counts and that there is a description of data."

" ....the demanding customers they want to know exactly what they buy....it's mostly bigger customers buying EPD".

In the buying-selling process this possibility to offer a declaration of contents is valuable in many ways. It can be something adding extra value (as indicated by the citations above) or something necessary depending on industry and environmental maturity.

" Well, today especially within administration there are requirements on suppliers and you are not even included if you cannot declare your products in a correct manner, then you are sorted out already in the beginning."

EPDs as declarations of contents are closely linked to the next aspect of the meaning of EPD. In order to be applied as comparable declarations of contents, EPDs must be based on objective facts, not values.

They present actual facts
The customer value of an EPD, for this group, is the objectivity of the description of environmental influence in terms of facts and figures.

" X is a heavy technical organisation and by tradition we have tried objectively with figures to show where we stand."

It is the objectivity of the EPDs, or the openness concerning environmental influence, that (hopefully) will give customers the possibility to describe and compare products along the environmental dimension. This characteristic of EPD information is very often contrasted to type I information, which is perceived as arbitrary and value-based. EPDs, according to this group, make it possible for customers to decide themselves what products are preferable from an environmental point of view.

" Green product is any products having some sort of description of the way of production. I mean we have mixed products or environmental products but for me a declaration of contents is numbers, facts and figures.... Type 1 does not demand anything from the producer, because there is someone who decides whether it is good or bad on behalf of the end consumer, if you fulfil the criteria it's good, if you don't it's bad, but you don't put any pressure on the producer as is the case with EPDs "

" I use to draw a parallel with the declaration of contents and that there is no one doing the valuation for you.... Concerning type III and EPDs you must judge if product X or Y is better than other products on the basis of your own values and these tables and facts will help you."

"-Why did you chose EPD and not type I?
- For me type I is no choice, it's a label you buy from X
- In what way is it no alternative?
- Well, what do you do when you say type I? You say it is a type 1and you have to pay 60.000 SEK per year, the requirements are not high!
- Do you mean that EPD implies higher standards?
- The requirements are much higher..... I mean they are meant for the customer to take a stand. And the declaration is very detailed..... it shows the figures clearly.....type I show x and some money, thank you. This doesn't cost anything and I feel that the certificator, which is the largest in Sweden, the objectivity of their study is clear, I can take the responsibility for that."

The perceived objectivity of EPDs rest on the assumption of standardisation of EPD information. In order for customers to be able to compare products, environmental impact must be presented in a similar manner or in relation to information about average for industry or product category.

The possibility on behalf of the customer to put pressure on producers by studying and possibly comparing EPDs is shown in the following citation.

" ....by doing an EPD you uncover all, you show incredibly open everything and this gives the customer a possibility to put a pressure on you because..... – Well we buy this but we will ask you to make these improvements as well."

4.2.2 Perspective 2 – To argue in favour of environmental level of ambition

Five persons represent this way of understanding EPD information. They are primarily senders of environmental information working at producing companies. These persons work primarily with EPD information. When talking and thinking about EPDs they focus on the *relativity of environmental influence*. For them EPD information is like a compass. EPD information helps them navigate among different environmental impacts. Which ones are significant and which

ones are not. For this group of people the use and communication of EPD information means that;

They have a possibility to focus on significant environmental aspects
The focus on the relativity of environmental influence implies that non-significant, environmental impacts are sorted out.

" Sometimes I'm invited too meet customers and then I describe our environmental work in general: how we work and I try to explain that we work with life cycle analyses and where in the chain the main part of environmental influence is found, that our environmental influence is primarily found at our raw material suppliers and that our production influence the environment to a very small degree. In principle it's a matter of some energy consumption, some waste, there are no emissions to air or water, but waste to incineration or composting or something else. And I try to explain that there is no such thing as a mountain of waste (sopberg), we talk a lot about this in Sweden. Maybe you can see a mountain of waste in relation to a nursing home but generally there is no such thing as a mountain of waste and this is a product that is adapted to existing waste handling systems. "

The focus on significant environmental aspects provided by EPD information is often compared to type I criteria.

" ....we want to make environmental assessments from a holistic point of view, that's why we look at LCA and when it comes to the "Nordic Swan" I think they go into details whose significant environmental influence is uncertain. I can give you an example: when we investigated environmental labelling of product X produced in the Y plant we would fulfil the criteria if we had not used solvents in the production.. They (the criteria) say nothing about emissions but the use of solvents means that you are disqualified. I'm convinced that when it comes to plant Y the requirements are so high and the use of solvents has no significant impact on the environment seen as a part of the products life cycle. In this case the question is whether one should prioritise principles or focus on that which is important from a life cycle perspective."

As stated in the citation above EPD information makes it possible to describe components or hazardous substances, in this case solvents, as a part of the entire life cycle of products. The focus on the relativity of environmental influence is clear in the same kind of reasoning below.

" – Is PVC still on the black list (svarta listan)?
- No, I would say that PVC has recently been removed from the black list, it has become quite accepted again.....Greenpeace has fought very hard to throw suspicion on PVC but I think the last reports show that it is not as dangerous as Greenpeace says.
- I got the same signal at company X
- Well.....PVC is in many ways a very good material and the dangers have been fairly exaggerated, it can be dangerous if you are a male mouse and eat a lot of softening agents. And you could refrain children from chewing it, to avoid toys is one thing but to include it for medical reasons, it has many advantages.....we have no interest in PVC because we do not use it but a follow the debate and the alternatives that have been developed they are almost always inferior both quality wise and environmentally wise. If you calculate it will show that the production of PVC does not consume a lot of resources, it's pretty much common salt."

Environmental efforts are concentrated towards those impact categories that are significant according to EPD information. Thus EPD information is regarded as a highly helpful tool making it possible to concentrate efforts aimed at improving the environmental performance of products/activities to areas important to specific industries.

" They (the Nordic Swan) do not take the energy consumption into account, they do not take transportation into account in any way and a small product is advantageous in this sense. They want to do something good but they put for example limits to the amount of plastic material allowed in the product. They do not take into account that if you have plastic material x in the products, and the best thing we can do is to replace biodegradable material with plastic material x because then we need less packaging and less transportation and we will actually improve our environmental performance."

Thus it is in the areas important according to EPD information that efforts are made to improve environmental performance.

" -...I see our task as choosing that which is important, well the life cycle must be neutral but when talking to the customer we must choose important areas.....we know that the green house effect and energy efficiency are global problems....and in our market communication we emphasise those parts...
- When you say that which is important do you mean important environmental problems that can be connected to you products?
- Yes exactly.....when it comes to our products I think we show five or six environmental impact categories and above all it is emissions to air, CO2, that we want to focus on."

The customer is able to distinguish between products

Another central dimension of EPD information reflecting the focus on the relativity of environmental influence is the distinguishing capacity of EPDs. This group of people regard the possibility to distinguish between products on the basis of environmental information as important.

" Concerning price there is an entire range, concerning function there is also a range where you have to take into account a lot of factors. In this context it's wrong to speak about the product's environmental performance in terms of good or bad, it's better to say it's 7,3 and the other is 7,2 and there is no difference, it's like the prices of 19,95 or 19,94, there is no difference in price."

" – I have understood that the XYZ labelling is easy to communicate and that it is simple.
- It has been good but now it has become quite blunt since there are almost nothing but Y and Z labelled products on the Swedish market and.... I mean to distinguish between products...you do not give consumers a big choice."

Mainly the possibility to distinguish between products environmental performance is thought as a helping device for customers who compare alternative products.

"the county councils we have asked whether they can distinguish between product A and B they have answered; - No we cannot-. They can possibly distinguish between companies concerning how serious environmental approach they have but concerning the products.....because that is what you want, in the end you want to be able to distinguish product A from product B."

".... Sweden is the country where customers put the greatest pressure on knowing....and then we value type III information higher since it's a description of facts rather than a Swan or something else saying – You are very much approved or you are not – but people have no idea about the basis for this judgement. We prefer a correct declaration, which is descriptive. The customers in Sweden demands it and I think we can use it as a tool in other countries and be ahead."

They are in possession of the privilege to influence the formulation of environmental challenges

Closely connected to the reasoning in the citation above is the next aspect of EPD information understood by this group. The use and communication of EPD information means that producers can influence the manner of declaring environmental performance for specific products

" It's very important to know what you have and to have a declaration which is scientific and correct.....we have written down that all our production units should be ISO 9000 certified and what we want concerning packages etc... and what we want to achieve with these declarations (Type III). We think, that since we know a lot about this subject and since we have worked with LCAs for many years we want to have a say concerning what is declared because otherwise there is a risk that those who are not familiar with the subject will write down something irrelevant and hence give the wrong picture in this case knowledge is power and we are to bring out facts and we have knowledge in this field."

" the cheapest and most simple for us as well as for the consumer and for the environment is to find methods that are relevant for our industry, but if someone suggests something not relevant that becomes a standard then you have to defend yourself all the time."

There are many arguments for why the business community must be able to influence the manner of declaring environmental performance for specific products. Great numbers of different forms to fill in sent by customers is one reason for the (re) formulation of environmental challenge. Companies need uniformity, both locally and globally, concerning demands on environmental performance. Estimates of the expected life length of products influencing the outcome of an EPD provide another reason.

The ability to influence the formulation of environmental challenges is understood by the person representing this group as relying on science.

"....we think of Sweden as a warning example because the government and local authorities have disregarded businesses and put a system under our nose without asking for our opinions, and it's a very bad system..., it's been incredibly bad at times....we would like a more scientific system, not a black-or-white system with a bar indicating that if you are over it you are a good guy if you only can make it to 99 percent you are a bad guy."

They present their environmental performance in a scientific and trustworthy manner
For this group of people communicating EPD information means presenting information about environmental influence in a scientific and trustworthy manner.

"- What does Type III information mean to you?
- ..it's good information...showing that we have performed a detailed analysis...
- What do you mean by good?
- ...I do not mean that it's environmentally good but..when you can show figures you get another trustworthiness and I want the information to be trusted... so that they won't question you...you can show that you have done these analyses."

" ....LCA, I feel they are quite scientific but I think this....If you could get it ready in a good way and make it type III or some sort of declaration and maybe add some average value....so that you can draw graphs and other things that people see and understand then I think it's a better tool because it's more facts and it's in favour of those who are serious because there are a number of players on the market that do not know and do not care. I feel that if we are serious and work more there should be some sort of reward..."

The scientific approach of EPD information is perceived to create goodwill as illustrated by the citation above. There is however a condition, partly implicit, for the creation of goodwill. EPD information, according to this interview person must be understandable. This reasoning is also reflected in the citation below.

" ..if you present an EPD and it's scientific it very easy becomes a document of chemical terms which is difficult to understand. Therefore it (the EPD) must be made in such a way that you relate the information to something else. Or it must be written in an understandable way so that you can judge whether it's bad or good by looking at the paper."

They must take on the responsibility for informing about EPDs
Interview persons in this group feel that they have to promote the use of EPD related information, especially in the case where it's used as an alternative to type I information.

"...we have taken on a heavy information load, it's much easier to say Yes we have the "Nordic Swan". Instead we have to inform a lot about our products, we'll have to explain that we do not have the "Nordic Swan" but our products are good or even better. We accept doing that because if we would apply for the "Nordic Swan" we do not think it will take us in the right direction."

" Type III is relatively unknown...If you ask people on the street today everybody is familiar with the "Nordic Swan" but no one knows about type III declarations, but we will have to work in order to make it well-known."

Informing about EPDs is in some ways linked to the facilitation for receivers to understand this kind of environmental information. There seem to be among the persons in this group a perception of a balance between how-easy-to-grasp EPDs can be made and the trustworthiness of the information.

"- If you think of support in terms of training or information activities, do you see such a need?
- Yes...if you want such a declaration and you want to understand it then you must educate yourself a bit, but I think it can be done in a popular (scientific) manner... look at car magazines...today there are environment declaration even in tests of boat engines...and then you see that this car is score 3,4, the average car scores 3,0 and you compare with a couple of others. The you draw a graph and you see, I mean you do not need much education to understand that."

4.2.3 Perspective 3 – To do your job

Two persons represent this way of understanding environmental information. They both work as purchasers at producing companies. These persons have come into contact with EPD related information to some degree but they do not work with this kind of information. Therefore other kinds of environmental information used by them were discussed in the interviews. These two persons use and communicate environmental information to a very small extent. Thus when talking and thinking about environmental information in general they focus on the *responsibility of somebody else*. For this group of people the use and communication of environmental information means that;

They are not affected in their work
This group do not use environmental information as part of performing their work. Environmental issues are perceived as the responsibility of someone else at another department. It is clear that the distribution of work maintains this situation.

"- I try to follow a bit, you do LCAs on you products?
- Yes that's right.
- Being responsible for purchasing do you get environmental information concerning your components?
- No, I don't ask for any such information, in that case it's up to our environmental department to ask our suppliers and then concerning the Product Safety Approval it's done by our environmental department."

" –What kind of environmental information do you use in your work?
- None....well the environmental issues linked to X concern the preparations and the chemicals used in preparations..... it's environmental work but it's nothing to do with purchasing, it's nothing that I work with."

"- When you purchase X do you consider environmental aspects, do you use any environmental information?
- Of course we do.....
- .....different X come from different suppliers, do you receive any environmental information from them?
- No, I think that's up to the plants, because what I do here as responsible for X and Y is to negotiate with suppliers ....but when it comes to ordering it's done locally by the plants and when they send an order and the supplier send a confirmation I guess they enclose some kind of product information so that's where the information comes in."

As illustrated by the citations above, environmental issues are not part of the purchasing function as this group represents it. Other departments or other functions use environmental information

They follow instructions
In the case these two people come into contact with environmental information of any kind, they follow instructions.

" If we raise our demands concerning Co2 it's not products safety but the environmental department that is responsible. They tell you which suppliers who go below the limits and which who don't and in that case I imagine

they would inform me like "Well we buy x from A but they do not fulfil our new requirements so we will have to buy x from B instead"."

" -..if it would come to our knowledge that one of our suppliers commits environmental crimes I'm sure it would affect our decisions.....but as a purchaser I have never asked for information about any substance.... but on the R &D side I've experienced that they ask directly about contents....
- In the research department they ask such questions?
- Yes
....if they ask those questions at the research department, do the answers affect purchasing?
- Well I think they would signal something like "Well John, did you know that the product you use coming from supplier x contains this and that?"."

They rely on experience

The persons representing this way of understanding environmental information perceive environmental problems connected to their industry as more or less solved. The environment, according to them, is no longer a big issue. Suppliers are doing their best and they see no great need to worry about environmental problems.

" When you buy product X or decide what product to buy, do you consider environmental aspects?
- Yes of course you do...well I forgot something important, the solvents, we have plants using solvents but they are used to these kind of products, they have bought them, they have the information, there are no strange things."

"- Are there some suppliers better than other concerning the environmental dimension? Or are they equally good?
- Yes as a matter of fact I think they are equally good..... All suppliers that we have visited...I do not know about their emissions to air but you can tell that they make an effort."

" – Are you the one who raise the demands or do the suppliers sometimes try to sell good environmental solutions to you?
- No I don't think so. Everyone is environmentally aware these days and the entire debate about X in the eighties it's not an issue any more..... I think that today great parts of the environmental debate and the environmental demands go without saying you'll be surprised if they do not fulfil your requirements."

4.2.4 Perspective 4 – To avoid known dangers

Four persons represent this way of understanding environmental information. They have been characterised as receivers of environmental information. They all work in connection to the purchasing function at customers to producing companies. They differ from the receivers representing perspective 1 as they purchase many different types of products, which can be described as more complex than the products purchased by receivers having perspective 1. Thus not only the products themselves but also the purchase situation can be defined as complex. These persons have come into contact with EPD related information to some degree but they do not work with this kind of information. Other kinds of environmental information used by them were discussed in the interviews. When talking and thinking about environmental information in general this group of people focus on *documented risks*. For this group environmental information is a possibility to avoid environmental hazards that are known. For them the use and communication of environmental information means that;

They have information about product contents

The persons representing this way of understanding environmental information to a large extent rely on environmental information provided by suppliers. The focus on documented risks makes this group concentrate on what products shouldn't contain. This kind of information about product contents is gathered through

1. Environmental declarations constructed by the buyer and filled in by suppliers, or
2. Product information sheets provided by suppliers.

" they (environmental declarations to be filled in by suppliers) cover the production of wood-pulp, the contents of plastic material, and then there is a question about latex, we do not want latex in the elastic...these questions are taken from the criteria representing different environmental labelling schemes"

"- You said that you demand that they declare the contents of their products?
- Yes.
- You don't just ask does this product contain X or Y, but they are expected to provide comprehensive product declarations?
- Yes, they must provide product information sheets.....in many cases when we have purchasers they demand that we have this product information so that they know what material and what chemicals they work with."

A third alternative way of controlling the existence of not wanted product contents is to provide information about these substances in the bidding process (PM för anbudsgivare).

"-... there are environmental manuals, which can be helpful...,.when we purchase painting as an example...you can find the criteria for what the paint should and should not contain....
-You send them a form to fill in?
- No these criteria are included in the inquiry (förfrågningsunderlaget)"

They drop products containing unhealthy substances

The reason for gathering information about product contents is clear in this group. They must, in order to perform their purchasing function well, have enough information to be able to drop products containing unhealthy substances.

"...I think you need a product declaration, a declaration of contents, we need that in order to decide whether to prohibit certain stuff, and then we must be able to choose and some things we drop, and we choose among what is left....."

" During the years we have been looking at latex because there are many persons allergic to latex, and we have been looking at PVC....we have tried to get rid of PVC here.."

"...we have a very good tool, a chemical data base, and we have what they call a prohibition list and a list for chemicals that a gradually phased out as well as a list for approved chemicals.....we are not supposed to have brominated flame retardants in our products."

" when we perform special tasks ....we need product information in order to be sure that we do not handle PCB or something similar.."

" ...I don't like the Nordic Swan for the moment because they allow small amounts of very dangerous substances.....it's a new rule..."

The reason for not using what is perceived as unhealthy substances is a reflection of the focus on documented risks. Only products containing substances that are documented to be unhealthy and therefore listed on prohibition lists, or that cause evident health problem, are avoided. Thus, this aspect reflects a responsibility for those who use the specific products.

" If I had an LCA on a chemical product, in addition I would probably want to know about the kind of chemical substances, perhaps something about pH value. It makes the suppliers crazy .....but for the products we buy there are substances causing allergic problems, so I would need information about health aspects..."

" -...then we focus on what is environmentally harmful in gardens, we have recently started an environmental inventory...aiming at uncovering if there are any environmentally harmful substances that the users are exposed to.
- So you focus on the exposure or users?
- Yes."

" – The latex issue, what is the background?

- It's an urgent matter in our industry, about 15 % of the personnel are allergic to latex, and we try to get away from latex...."

They are able to rank products on the environmental dimension

For purchasers handling large amounts of products it is important that environmental information makes it possible to easily compare alternative products along the environmental dimension.

" ...we purchase maybe a hundred products at the same time and we get offers from five or six suppliers for each product and it's a lot of products. If you want to talk about LCA it's only practically possible if it's comparable, it must be the same for all products, you cannot think, calculate and make subjective judgements...."

"- As I see it, it is difficult for us to make (environmental) judgements, that's why this "Nordic Swan" is convenient or some other type of similar system when you know that the judgement has already been done.... in other situations as well you might want to make calculations, judgements or valuations, and it (environmental judgements) will be done to the extent there is time, resources and competence. It's not clear that I have this as a buyer...you'll have to find short cuts showing us clearly what is good.....it takes a lot to be able to value...one would want to get the entire product graded according to the environmental dimension instead.
- Yes, what do you mean by graded?
- Well, it can be in terms of a classification, class one to five or something like that and then, as an example, we decide not to buy anything worse than class two "

The purchasing practice of this group of people make the use of certain heuristic helpful when trying to rank alternative products along the environmental dimension. As in the citation above some prefer already existing criteria as the Nordic Swan. Others, as reflected in the citation below, have elaborated their own methods aiming at facilitating the environmental ranking of products.

"-...concerning the purchase of X we had a system of points, but normally we do not have such a system. Instead we have remark or no remark and then you can say that there are serious and less serious remarks.
- What generates a remark? Is it linked to the information provided by the environmental declarations (here form developed by buyer to be filled in by supplier)- Yes, that's right."

No one in this group use LCA based information to rank products but some are familiar with LCA methodology and thinking. One reason for not using LCA based information in this group is the Swedish law on public purchasing.

" ..life cycle assessments are difficult to calculate....but if, sometime in the future, you can get something that will make good judgements and good comparisons possible between different (products) I do not mind. But it must be something built on a standard or on facts so that these judgements are possible. If suppliers provide different (methods) it can be difficult for us to evaluate them."

" We tried to apply LCA thinking during a period when we constructed the environmental declarations (here form developed by buyer to be filled in by supplier we looked at production processes which we don't anymore, neither do we look at means of transportation or transportation routes.... but when we understood what the regulation about public purchasing (Lagen om offentlig upphandling) is all about we dropped the process questions."

Other opinions about LCA based information are reflected in this citation.

" –Is there some one who can value it (EPD information)?
- Well I suppose there is, but you have to be familiar with it.
- Well, maybe you can .....is there no authority where this can be valued, is there no place where they value LCAs, and who can prioritise....
- Well, maybe in the future...
- Yes, because we cannot do it.
- No
- You cannot count on that."

They weigh the environmental dimension against cost and function

A central aspect within this group is the weighing of products' environmental performance, function and price.

" -...Mrs puts together her judgements and she ranks the suppliers from an environmental point of view....then we discuss. I put forward the financial and functional requirements and Mrs A say something about the environmental performance end the we try to agree about one products....
- When you take the decision, is it based on Mrs A:s...
- It's based on Mrs A: you can say there are three important things in the purchasing process: it's function. The product must function. And that's the most important, then it's price and then it's environmental performance."

" One can say that environmental performance is taken into consideration to a great extent, it's different in different product groups.... sometimes it's more expensive, sometimes it's cheaper.....but we do not buy extremely expensive..."

The purchasing practice represented by this group defines different ways of thinking that influence the outcome of weighing environmental performance against price and function.

" ...the PVC debate has made....we are not supposed to have any PVC products but in X there is no alternative..., well Y but then you'll have to have other chemicals so therefore we have not banned it in this limited area. The same applies to PVC products in Z areas. They are exposed to a lot of moisture, and to change products often is a waste of resources. If you use a PVC product, they last much longer..."

They make things clear
For these people it is important that any environmental information is clear and easy to understand.

" ....concerning communication it's important that we trust that the products we buy are environmentally assessed and that it's good for the environment and that it protects the personnel from different... It is important that you try to explain in such a way that people understand..."

" I think you should provide our users with this information, and make it as understandable as possible....because when I see this (EPD) I do not understand a thing. I think.you must know what is important and interesting for our users, and then provide them with information..."

The wish to understand environmental information is linked to former aspects as for example the possibility to rank products according to environmental performance.

" ...we must know that the way of measuring is the same ..and it's the same for all these systems, we must have simple ABC classification on all products..."

4.2.5 Perspective 5 – To work for a sustainable society

One person represents this way of understanding environmental information. This person has been characterised as a receiver of environmental information, working with environmental issues at a customer to a producing company. This person has come into contact with EPD related information to some degree but does not work with this kind of information. Other kinds of environmental information used by this person were discussed in the interview. When talking and thinking about environmental information in general this person focuses on *precaution*. For this person the use and communication of environmental information means that;

He/She applies a precautionary principle

Unlike the interview persons representing other perspectives, this person is unique as precaution is in focus when perceiving environmental information. This focus on precaution implies that not only substances that are proven to be harmful are avoided but also substances running the risk of being so.

" ...I'm not a chemist but....one mother told me one thing that made me see things clear – For reasons of caution I do not want my children to have contact with products containing PVC –Okay I thought, that's enough, a precautionary principle is reason enough so we banned all PVC products immediately.....you have to use a lot of common sense and often the precautionary principle"

".. company A and B want to install 30-40.000 product X .....and I've told them -okay just sign this paper that you guarantee it's not dangerous. And they say – we can't do that, and I say –well there won't be any product x then. But they are just like the Z business, they call every second day and provide me with court decisions taken before we had the present environmental legislation. But it doesn't help and I mean that they all say it's not dangerous according to today's knowledge, it's not enough for me who is supposed to tell a family of three children that your kids will probably not get cancer from this. So we banned it last week"

" ...it's very important to us, what's happening in this project....we have simple principles, mechanical work, no chemicals....it's the old way of working."

- He/She avoids hazardous substances and substances that might be harmful

Clearly the focus on precaution is closely linked to the avoidance of hazardous substances.

" ...today it's simple, I only tell every one that we demand The Nordic Swan or Good Environmental Choice (Bra Miljöval) and then it's very clear, but this is a complex line of business, today we work very hard with product X. There are ten to fifteen suppliers and we have analysed the contents of their products and we have told them that we do not want Y, nor Z and W. Eventually we pick three products and after six months the product is gone, they have a new product containing something else which they think is better and we have to start all over again. It's very difficult."

"... product X is our big problem at the moment, talking about place Y it cost us as much to clear it of product X as to build it."

He/She is responsible for users

This aspect of responsibility for users is closely linked to the former aspects. Measures reflecting the focus on precaution clearly are linked to the welfare of users (see aspect precautionary principle above).

" ..I've come across products where it says you must protect yourself with glasses and gloves, there must be good ventilation, you can become unconscious and so fourth.....but after when it's going to be used, what happens then. They say nothing it's going to leak....but after a while we notice it's leaked"

He/She is familiar with product contents

The focus on precaution requires a familiarity with the contents of products. Here it is important to know not only what the product does not contain but also what it contains (compare perspective 4, They have information about product contents)

" ...if there was information so that one could compare product Z coming from different suppliers, where it says that this product contains this or that substance and in what way the substance can be harmful to human beings, that kind of information would be perfect."

" ...if there was a column that all people could....if you take brominated flame retardants as an example. It can be named almost anything...it's impossible to learn and if I have a product information sheet of course it doesn't

say....there is only the chemical long name, it doesn't say brominated flame retardants so if you're not a chemist you have no chance in this line of business, its very difficult."

He/She has an influence on participants in the business

This person is aware of, and frequently uses, the influence the company have on suppliers and other actors in the business.

"...If we take the PVC example I called company A.....and they say – You know what, PVC free products just arrived, and they had it in their wardrobe for ages, but if there is no pressure from customers they will not appear on the market."

"...well I look at nothing but energy, x and PVC....we are their biggest customer in the world, we buy a lot of products, we can tell them what to do."

" ....we have noticed that in order to be a supplier for this project, they change the contents of their products within 24 hours."

4.2.6 Summary of perspectives

The five different perspectives, or ways of understanding environmental information are summarised in table 1.

To adjust to the market	**To argue in favour of chosen level of ambition**	**To do your job**	**To avoid known dangers**	**To work for a sustainable society**
Focus: surplus value	Focus: the relativity of environmental influence	Focus: the responsibility of somebody else	Focus: documented risks	Focus: precaution
Senders and receivers of EPD information	Senders of EPD information	Purchasers, do not use EPD information, do not use environmental information	Receivers of environmental information, do not use EPD information	Receiver of environmental information, does not use EPD information
* They have a possibility to make money * They adjust to the needs of the market * They have the possibility to offer declarations of contents * They present actual facts	* They have a possibility to focus on significant environmental aspects * The customer is able to distinguish between products * They are in possession of the privilege to influence the formulation of environmental challenges * They present their environmental performance in a scientific and trustworthy manner * They must take on the responsibility for informing about EPDs.	* They are not affected in their work * They follow instructions * They rely on experience	* They have information about product contents * They drop products containing unhealthy substances * They are able to rank products on the environmental dimension * They weigh the environmental dimension against cost and function * They make things clear	* To apply a precautionary principle * To avoid dangerous and uncertain substances * To be responsible for users * To be familiar with product contents * To have an influence on participants in the business

In table 1 the patterns distinguished among the eighteen personal interviews are summarised:
* Senders of environmental information working in producing companies have more experience in, and actively use EPD information, than receivers of environmental information related to purchasing in companies being customers to these producing companies.
* The differing ways of understanding environmental information in general and EPD related information in particular is in part a reflection of environmental exposure and pressure related to specific industrial sectors. This is evident in the case studies presented by Jönsson (Jönsson 2000) where representatives for the building, energy and automotive industry see different environmental issues as the main environmental challenge facing their sector. Jönsson reports that the building industry focus on declaration of product contents, the energy industry focus on use of resources and emissions to air whereas the focus of the automotive industry is on fuel consumption and emissions when using the car. In this study this is exemplified by the fact that all but one person representing perspective 1 work within the same industrial sector. This might explain why two receivers working in this line of business also represent this perspective.
* Most senders and receivers of environmental information understand environmental information in fundamentally different ways. There is one exception to this rule as two receivers purchasing one type of simple product have perspective 1.
* Receivers performing, or supporting, a purchasing function differ in their understanding of environmental information due to the complexity of the purchasing situation. Receivers facing the task of purchasing great numbers of different products represent perspective 4 and 5 and receivers purchasing one single and simpler product represent perspective 1.
* Purchasers at the producing companies surprisingly enough do not use any environmental information at all. This reflects an organisational shortcoming that can be said to neutralise efforts to disseminate EPD information within these organisations.

There are two main dividing lines between senders and receivers of environmental information in this interview study.
1. Senders and receivers differ concerning the perceived importance of the need for information about hazardous substances. Senders representing perspective 1 do not talk about hazardous substances, which is explained by industry specific environmental issues (see discussion above). Senders representing perspective 2 (representing two industrial sectors) understand hazardous substances as a part of products' entire life cycle. Their focus on the relativity of environmental influence makes them disregard hazardous substances that according to EPD information has no significant impact from a life cycle perspective. These senders of environmental information prefer EPD related information to type I environmental labelling as the former supports their view on hazardous substances. They disagree with type I criteria that restrict the use of certain substances or materials having little impact on products' environmental performance seen from a life cycle perspective.

Receivers on the other hand, representing perspective 4 and 5, understand hazardous substances in a way that means that they should be avoided. They are in a great need for knowledge about product contents in order to keep away from any product that contains what they regard as substances hazardous to health or environment. Receivers representing perspective 4 focus on documented risks which is reflected in their view on hazardous substances as those being listed in prohibition lists (Svenska Kemikalieinspektionens begränsnings- och observationslista) or those causing evident health problems (e g allergic problems). The receiver representing perspective 5 focuses on precaution and thus understands hazardous substances as not only those substances that are documented to be unhealthy but also those that might risk being unhealthy or whose effects on environment and health are uncertain.

2. Senders and receivers also differ concerning the perceived need to place alternative products in order of precedence/ rank products. Senders representing perspective 1 and 2 emphasise the scientific nature or the objectivity of EPD information that enables customers to decide themselves what products are preferable from an environmental point of view. Having all facts about the environmental performance of products, maybe in combination with some average value that you can relate individual products to, will enable customers too make informed environmental choices. Thus the whole point of producing EPD information such as it is understood by senders is that no one else but the customer is to judge the environmental performance of products. Receivers representing perspective 4 and 5 on the other hand feel that they need help in judging the environmental performance of specific products. Regardless of what kind of environmental information they use, they find it difficult to rank product alternatives according to their environmental performance. This is the reason why they find type I environmental information helpful and in some case more easy to use for comparative purposes than EPD related information when comparing product alternatives. Some receivers declare that it would be impossible to rank products on the basis of EPD related information as they lack knowledge, time and resources to judge this kind of information. Other receivers point out the kind of information about hazardous substances and their effects that they would need in order to rank products, and that is missing in EPD related information.

These two fundamental differences between senders and receivers in the personal interview study provide a challenge to a common Nordic EPD system. The seemingly unbridgeable views on hazardous substances and ranking found among Swedish companies in the personal interview study require that efforts are made to make the format of a Nordic EPD system more user friendly than Swedish EPD related information.

4.2.7 The importance of certification, the possibility to add up data and a common layout

The personal interviews provide clear answers to the certification issue. A majority of the interview persons see certification of EPD information as crucial to the trustworthiness of an EPD system. Thus the answers can be regarded as unanimous concerning certification as such. Some interview persons emphasised the cost of the certification process, which might restrain companies from providing EPD information on more than just a few of their products. Other interview persons regarded the Swedish system of accreditation as the guarantee for the trustworthiness of the system.

Concerning the possibility to add up data within an EPD system all interview persons working in sectors where such calculations are possible, were positive. In some industries the possibility to add up data is regarded as crucial as this possibility is one central sales argument for products having an EPD.

The question whether a common Nordic EPD system should include common layout format also provides a clear picture. The idea of a common EPD layout was discussed as sector specific, i e as a tool to facilitate comparisons of alternative products within given product groups. All but three senders considered a common EPD layout important or acceptable. Those seeing a common layout as important emphasised the possibility for users to compare products. Those seeing a common EPD layout as an acceptable idea hadn't thought about this matter before the interview but as the question was reflected on the perceived advantage of facilitation of comparisons stood out clearly. Three senders (out of nine) do not think a common EPD layout is necessary. They argue that professional purchasers are able to handle different layout formats

and that there might be a risk that some important data will be lacking if all EPDs must look the same.
All receivers consider the possibility to compare products' environmental performance as a very important part of their work. Often they handle large amounts of products and the ranking of environmental performance should be as easy and quickly as possible. Thus from the receiver point of view a common EPD layout obviously is crucial for the effectiveness of a common Nordic EPD system.

4.2.8 The importance of support

The issue of support concerns what activities are needed to ensure an effective and widespread use of EPD information both within and between organisations. All senders and receivers feel a need for different kinds of activities aiming at raising the level of knowledge and awareness vis-à-vis EPD related information. The question of support has not been discussed with receivers not using EPD related information

The personal interviews give a clear indication of the following types of support to be important;
* Internal support
- Education of personnel, salespeople in particular, concerning what an EPD is, what it means to use EPDs etc,
- The existence of an EPD in-house expert, available to salespeople when expertise is needed.
* External support
- The spreading of information /marketing of the EPD system as such preparing and learning customers about EPD information, what it is and how it can be used,
- A forum for discussion and exchange of experience regarding the use of EPD information.

In addition top management support was mentioned as crucial as well as support in order to simplify EPD related information.

4.2.9 Flow of communications

One focus in the personal interview study was the descriptions of flows of communications regarding EPD related information. According to the thirteen interview persons working in organisations were EPD related information is used, the dissemination of this kind of environmental information is very limited in all but one company. EPD related information is not information most people in the organisations use. According to the personal interview study EPD related information is primarily a matter for environmental departments, sales people and R &D departments. EPD related information does not affect purchasing in the companies sending this kind of environmental information LCA thinking to some degree and in some situations affect decisions concerning investments and new products according to the personal interviews.

5. Crucial aspects of communicating EPD systems

One of the aims of this user requirement study was to describe the crucial aspects of communicating EPD systems both within and between organisations. Data has been collected in focus group interviews in Denmark, Sweden and Norway and in personal interviews in Sweden. Together the results from the interviews provide a clear picture of what will be the major challenges for the communication of a common Nordic EPD system. The description of crucial communication aspects below is closely linked to the main aim of the Nimbus project *to promote more ecoeffective products and services.* In this communication study this purpose is viewed

from the user perspective. The user perspective has been formulated in one of the stated sub-purposes of Nimbus; *To present user friendly formats and instructions for use of generic and sector specific EPD systems.* Thus the description of crucial aspects of communication that follows has the practice and needs of present and potential users of EPD information as a point of departure. There are different kinds of users represented as interview persons in this study. The dichotomy sender-receiver of environmental information has been chosen to illustrate differences in understanding and use of this kind of information. Senders are defined as those primarily sending environmental information as a part of performing their tasks. Senders in this study work in producing companies selling products to companies where the receivers represented in this study work. Thus senders can be seen as producers of environmental information. Receivers in this study perform or support a purchasing function. As described in the presentation of perspectives the receivers are characterised as having a more or less complex purchasing task. These differences are reflected in different ways of understanding environmental information.

One important reflection that needs to be made explicit before describing crucial aspects of communicating EPD systems is the overreaching goal of the system itself. The conclusions of this study mainly refer to inter-organisational buying and selling processes, i e processes going on between organisations. However in the focus group interviews as well as in the personal interviews frequent references to the use of EPD related information in product development and process optimisation are made. Thus it is important to distinguish between the use of LCAs and EPD related information (quantitative LCA-based environmental product information). It is suggested here that EPDs are seen as an instrument communicating the environmental performance of products and services to the market, which makes issues as verification, certification and trustworthiness important.

In the description of crucial communication aspects frequent references are made to a recent study by Jönsson (2000). Her comprehensive and critical review of the prerequisites for efficiently communicating products' environmental characteristics, as well as her case study results, support the results of this study in many ways.

5.1 The establishment of a basis enabling the judgement of environmental performance

The most important challenge to a common Nordic EPD system is probably to establish guidelines for EPDs that enable users to judge, and compare, the environmental performance of alternative products. The comparative nature of EPD information is indeed one of the stated aims according to Svenska Miljöstyrningsrådet (Miljöstyrningsrådet 1999):

" For receivers of EPD information, i e. professional purchasers within business and organisations, certified EPDs provide information that can be used in connection with requirements regarding objective and comparable environmental information..."

However, the results of this study provide evidence that much needs to be done in order to make EPD information an effective tool that can be used when comparing the environmental performance of products. There are many arguments supporting this line of reasoning.

Results from the focus group interviews and the personal interviews show that the comparison of products along the environmental dimension on the basis of EPD related information is perceived to be difficult. The focus group interviews indicate that the demand for type I environmental information and information about hazardous substances is greater than the

demand for EPD related information. The results from the personal interviews shed light on this situation. The personal interviews show that in the case type I information is used in purchasing processes it's because this kind of information provides judgement about environmental performance that enables them to compare products. The demand for information about product contents functions in a similar manner. Representatives for industries where hazardous substances is regarded as having the most significant environmental impact, need declaration of contents in order to compare products.
Some receivers in the personal interview study do not even think that it's possible to rank products on the basis of EPD information as this kind of information is considered too complex and much too time-consuming to work with. This is supported by an earlier study on the ability of professional purchasers to use type III declarations (Fallenius, Sjöstedt et al. 1997). This study reports the general finding that professional purchasers did not consider themselves having enough knowledge to evaluate type III declarations considering that no threshold or average values to use in comparisons were given. Jönsson (Jönsson 2000) draws a similar conclusion based on her case studies: "one explanation of why the EPDs are not used to a greater extent, which is common for the three industry sectors, is the perceived complexity of the information, p.140." Some senders acknowledge the need for understandable EPD related information. Average values or graphical illustrations that enable the user to judge whether a product/service is "good or bad" are proposed in the personal interviews.

The ambitions of senders are highly relevant when trying to facilitate the use of EPD related information when comparing and ranking products' environmental performance. In the personal interviews as well as in the focus group discussions EPD related information was perceived as providing arguments for the environmental relevance of different environmental impact categories related to the phases of products' life cycle. However, these arguments may not be evident to receivers lacking knowledge that enables them to interpret and value EPD related information. Thus, the relativity of life cycle phases in relation to specific products' environmental performance evidently needs to be clarified and, as a suggestion, illustrated in a simple manner. A clarification of the relativity of environmental performance in relation to phases of the life cycle would probably contribute to the ability of purchasers to compare products as relevant impact categories more easily can be identified and focused on. Such a clarification or illustration would certainly also bring senders and receivers closer to each other concerning the environmental relevance of hazardous substances.

The establishment of a basis enabling the judgement of environmental performance is probably made more difficult by the widespread perception among senders of EPD related information that this information is objective and value-free as opposed to type I information which is seen as subjective. This perceived objectivity of EPD related information is stated in the information material provided on the Internet by Svenska Miljöstyrningsrådet (Miljöstyrningsrådet 1998):

"As this information is neutral and contain no values it's up to the receiver to take a stand and judge the information on the basis of the data concerning the environmental characteristics of products and services provided by the declaration."

Jönsson(Jönsson 2000) point to the fact that the subjectivity, in terms of different value choices in LCAs is acknowledged both in the Nordic Guidelines on Life Cycle Assessment (Nordic Council of Ministers 1995) as well as in the ISO technical report on Type III environmental declarations, ISO/TR 14025 (14025 1999). Her arguments are relevant to the discussion about the possibility to judge, and compare the environmental performance of products and services on the basis of EPD related information.

" A limitation of LCA-based environmental product declarations is therefore the problem of communicating the numerous assumptions and value judgements on which the information is based. These assumptions must be made visible, in order to not give a false impression of objectivity and to support a reasonable interpretation of the declaration (Jönsson 2000, p. 40)

A common layout format of a common Nordic EPD system will, according to the interviews, increase the possibility on behalf of purchasers and receivers to compare the environmental performance of products and services on the basis of EPD information. In the process of handling and evaluating large numbers of different products, common layout standards will be a necessary ingredient.

Learning from the interviews in this study and earlier studies in the field one can conclude that five important factors contribute to an EPD system that provides the basis for judgement of the environmental performance of products and services. These factors are summarised in figure 3.

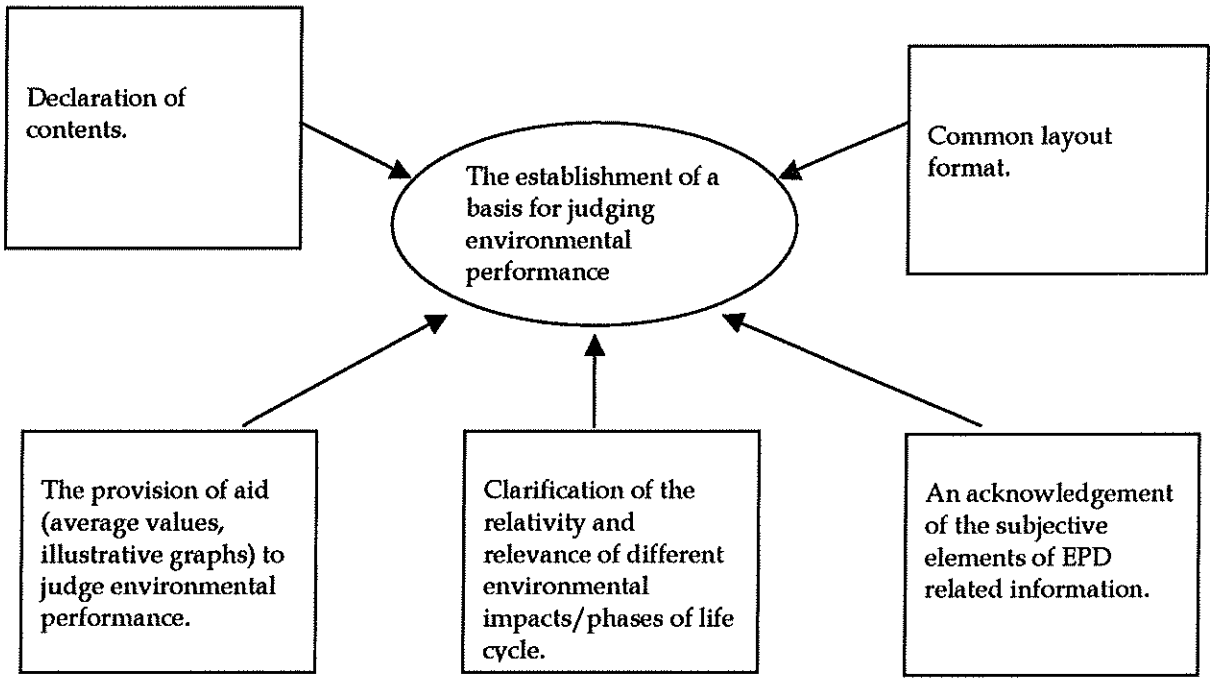

Figure 3. Factors contributing to an EPD system that provide the basis for judgement of the environmental performance of products and services.

5.2 Information about hazardous substances

A central dividing line between senders and receivers of environmental information distinguished in both types of interviews is the perceived need for information about hazardous substances. In the focus group interviews senders stated that there is a market demand for such information. In the personal interviews receivers stressed the importance of information on hazardous substances. The focus on substance content in certain industries is supported by Jönsson (Jönsson 2000). She questions the extent to which the Swedish EPD system corresponds to initial intentions as declarations of contents are optional in the Swedish system (Miljöstyrningsrådet 1999). The Swedish Environmental Protection Agency suggested in a report in 1999 that product-related information should cover four parts (Naturvårdsverket 1999). One of these four parts is stated as *information about product contents focusing on significant amounts of hazardous substances*.

The receiver representing perspective 5 describes how easy-to-use, and easy-to-understand declaration of contents could look like:

" ...if there was information so that one could compare product Z coming from different suppliers, where it says that this product contains this or that substance and in what way the substance can be dangerous to human beings, that kind of information would be perfect."

The same person explains why it is perceived as difficult to apply a precautionary principle (or a principle of substitution) to substance content.

" ...if there were a column that all people could....if you take brominated flame retardants as an example. It can be named almost anything...it's impossible to learn and if I have a product information sheet of course it doesn't say....there is only the chemical long name, it doesn't say brominated flame retardants so if you're not a chemist you have no chance in this line of business, its very difficult."

5.3 Learning about EPD information

EPD related information and a common Nordic EPD system require marketing efforts. If common Nordic EPDs are going to be "meaningful to the receiver" as stated by Svenska Miljöstyrningsrådet (Miljöstyrningsrådet 1998) and regarded as a complement to type I environmental information, efforts must be made to educate users about the system as such. The Swedish EPA (Naturvårdsverket 1999) concludes that the general level of knowledge about the environmental characteristics of products is poor. Jönsson (Jönsson 2000) notes that in the industries studied by her, EPD information was seldom put to any use. She interprets this as being partly explained by a lack of customer pressure vis-à-vis manufacturers to improve products' environmental performance.

The results of this study and its support in studies like Jönsson thus point to the importance of marketing of a common Nordic EPD system. There is a great need for learning about EPD related information both within organisations producing/sending, and organisations receiving this kind of environmental information.
The interviews provide a picture of the kind of knowledge that is needed regarding EPD information:

-What is EPD related information? What does it stand for?
-What does EPD related information mean in terms of consequences for health and environment?
-What does it mean to use EPD related information?

The education of sales people obviously is crucial in an introductory phase of an EPD system, when customers pressure and demand for this kind of information is lacking. The following citation from the Swedish focus group interview captures the need for learning about EPD related information:

" This study is about the problem of getting marketing people and salespeople to understand this technical information. In reality, technicians and salespeople and marketing persons have different preferences. As a technician you want the information to be understandable and easy to read, as a marketing or sales person you want information that your customers can understand and that you can use in the marketing of your products.....I've been training our salespeople for many years, talking environmental adjustment and AOX (absorbable organic halogens) and COD (chemical oxygen demand), at least three or four times. Still most salespersons have difficulties explaining what AOX stand for, they almost understand it but they find it hard to say. Eventually when they have to explain this to the customer we have a problem, because she/he finds it even more difficult to understand."

Frankl and Rubik (Frankl and Rubik 2000) list "the disappointment of marketing "as one barrier for the future use of LCAs.

" The application of LCA for marketing and business-external communication/information is unsuccessful at the moment. It is remarkable that within our case-study sample, often the marketing department joined (or initiated) the process of LCA. But their hopes and expectations were disappointed because results of LCAs are not easy to use for marketing..."

One theme in the personal interviews when discussing support and marketing was the role of Svenska Miljöstyrningsrådet. Some senders would have liked Svenska Miljöstyrningsrådet to take a more active part in educating potential users/receivers of environmental information about

the Swedish EPD system. These senders thought information/marketing activities concerning the EPD system no doubt would have a greater effect if sent by an authority than by them. They acknowledge the information sent out on the Internet by Svenska Miljöstyrningsrådet but they would welcome more educational efforts vis-à-vis corporate customers, which would function as support for their products having EPDs. This line of reasoning is supported by other senders that report they have taken on a heavy responsibility for educating their customers regarding the EPD system and EPD related information.

5.4 Use of EPD information within organisations

Another major challenge facing a common Nordic EPD system is the dissemination of EPD related information within organisations. The focus group interviews indicate the same state of the art as the personal interviews regarding the use of EPD information in organisations.

In organisation were EPD related information is used, the dissemination of this kind of environmental information is very limited. EPD related information is not information most people in the organisations use. According to the interviews EPD related information is primarily a matter for environmental departments, sales people and R &D departments. EPD related information do not affect purchasing in the companies using this kind of environmental information. Even though this kind of information in some cases is used by market departments its use hasn't affected tasks performed within these departments. Frankl and Rubik (Frankl and Rubik 2000) support these results as in many ways. When studying the application patterns of LCAs in Italian, German, Swiss and Swedish companies using LCAs they conclude that the identification of bottlenecks is the most important application. LCAs are not used as a routine tool for neither product innovation, nor for purchasing. And the application for marketing is low. Baumann and Wolff (Baumann and Wolff 2000) report the areas of application for LCA in listed Swedish companies in 1995. Fourteen of the listed Swedish companies used LCAs to analyse their own products in 1995, eleven companies used LCAs in products development and nine companies used this information in their choice of suppliers and raw materials.

The somewhat surprising result that purchasers representing producing companies in the personal interview study do not use any environmental information in the procurement process indicates the importance of organising. The environmental scrutiny of suppliers is instead performed by other departments for example the environmental department. The focus on somebody else's responsibility, that characterises how these purchasers understand the use of environmental information, makes explicit the importance of organising for the dissemination of environmental awareness. Jönsson (Jönsson 2000) suggests the same situation.

" One problem is that it is often a small group of people in a company that is actually involved in and affected by the process of developing EPDs. The environmental products information is often not included in the common information flow, but needs to be actively pursued. The information is thus seldom spread outside the environmental and marketing departments, to for example, product developers and purchasers (p.139)."

Frankl and Rubiks book (Frankl and Rubik 2000) is an excellent review of the different phases a company goes through as LCAs are adopted as well as a description of crucial actors or change agents within each phase in the adoption process.

5.5 The distance between senders and receivers of environmental information – theoretical reflections

There exist a difference between senders' and receivers' perceptions of environmental information. This is illustrated by the descriptions of perspectives above as well as in the

discussion about the possibility to judge the environmental performance of products and services and the perceived importance of content declarations. This difference in perception of environmental information is relevant to the effectiveness of a common Nordic EPD system. Jönsson (Jönsson 2000) states that:

" The usefulness of EPDs is further limited by the perceived mismatch between the information needs of the customers and the information supplied by manufacturers (p.148)."

Obviously in this report there is room for some theoretical tentative explanations of the distance, or mismatch, between senders and receivers of environmental information. How come the distance is so great between the two groups? Can it be explained by industry affiliation or lack of knowledge regarding EPDs and LCAs? Or is there something else we have to bear in mind when planning to introduce a common Nordic EPD system?

The distance between senders and receivers is illustrated below by a discussion about the mountain of waste (sopberget) in two personal interviews. The sender argues that there is no such thing as a mountain of waste.

" Sometimes I'm invited too meet customers and then I describe our environmental work in general: how we work and I try to explain that we work with life cycle assessment and where in the chain the main part of environmental influence is found, that our environmental influence is primarily found at our raw material suppliers and that our production influence the environment to a very small degree. In principle it's a matter of some energy consumption, some waste, there are no emissions to air or water, but waste to incineration or composting or something else. And I try to explain that there is no such thing as a mountain of waste (sopberg), we talk a lot about this in Sweden. Maybe you can see a mountain of waste in relation to a nursing home but generally there is no such thing as a mountain of waste and this is a product that is adapted to existing waste handling systems. "

The receiver on the other hand (buying products from the sender in the citation above) sees the mountain of waste as problematic.

" ....one aspect is the amount of waste it generates, concerning product X we've had this question of the growing mountain of waste on the agenda permanently. We wish they had a kind of plastic in this product that you could put in a compost in order for us to choose how to get rid of the waste..."

Haugland and Grönhaug (Haugland and Grönhaug 1988) provide a theoretical model for understanding why there is such a big distance between senders and receivers concerning their perceptions of environmental information. Haugland and Grönhaug suggest that within a distribution chain exporters emphasise product attributes close to production whereas importers tend to emphasise product attributes close to their understanding of consumer preferences. This model receives support in Korneliussens study of quality perceptions in distribution of Norwegian farmed salmon to Singapore. Korneliussen shows that importers and supermarkets in Singapore value product characteristics as size, smell, fat content, appearance, and country of origin. One can assume that these kinds of product attributes provide guidance to consumers as to whether food quality is good or not. Exporters and fishfarmers in Norway on the other hand perceive the quality of salmon as related to product characteristics as weight, availability, temperature during transportation, marking on cases etc.

The descriptions of perspectives in this study can be analysed as a parallel to Korneliussens study, supporting Haugland and Grönhaug. The perceived importance of declarations of contents and the possibility to judge environmental performance characterising receivers (with a few exceptions) no doubt reflect consumer preferences to a higher degree than senders emphasis on objectiveness and significance of environmental impacts. Thus it seems reasonable that the

difference between senders and receivers regarding what they perceive as useful environmental information can be interpreted as reflecting the different worldviews of producer and consumers. Producers represented as senders in this study value EPD related information that in a fair an unbiased manner describe the environmental effects of producing their product (important to note here is that content declaration and declaration of recycling, not really associated to production are optional in the Swedish EPD system). Corporate customers represented as receivers in this study are closer to end consumers than senders in the distribution chain. They value, and use, environmental information that provide them with knowledge about substance content and the ranking of environmental performance, factors which probably affect consumer preferences and choice. When deciding what product to buy it is plausible that consumers value the non-existence of hazardous substances higher than the scientific nature of environmental product declarations.

In the example of the differing views on the mountain of waste above it is obvious that the receiver is the one who is in practice handling the waste associated to the products. The senders, as a producer, are not dealing with, but merely talking about, this potential problem. Thus the receiver no doubt reflects the attributes that are linked to final use of the product, whereas the sender emphasise production-related attributes. The Haugland and Grönhaug model makes it easier for us to understand why in this study receivers emphasise toxicological aspects and responsibility for users to a higher degree than senders do. The receivers in this study are closer to end consumers than senders when seen from a distribution perspective.

What are the effects on an EPD system when senders and receivers understand environmental information differently? Perspective 1 and perspective 2 (representing senders with two exceptions) in this study indicate that within the Swedish EPD system there are at present no incentives for environmental adjustment on behalf of the producers. Senders representing perspective 1 and 2 talk more about market possibilities and scientific environmental measurement than issues related to environmental improvement. Thus the effect of talking about different things, as is the case with senders and receivers of environmental information in this study, is the non-pressure on producers to make environmental adjustments. Presumably there must exist, within a common Nordic EPD system, a customer pressure that ensures that producers continuously improve the environmental performance of products and services. In her case study Jönsson (Jönsson 2000) sees effects of senders and receivers not talking about the same things:

" Both in the car and the energy industry, the environmental product declaration run the risk of being interpreted as an award for good environmental performance. In these industries, the environmental product declarations have been used mainly as a product differentiation in marketing (p.139)."

Jönsson states that "environmental product declarations (in the Swedish context) in the current form and context could not be expected to result in more than marginal effects on awareness and behaviour of business actors (p.149)".

5.5.1 A new eco-function paradigm, a challenge of the future

The description of perspectives in this study show there is not only variation between groups but also within these groups. The two citations below exemplify the distance between two receivers representing perspective 4 and 5. The citations illustrate two fundamentally different ways of understanding, and handling, a new situation related to low energy-consuming refrigerators.

"...last year when we were to purchase refrigerators and freezers to place X....we took a close look at the different types of products, the consumption of energy and.then if you look at the volume, the storage volume you soon find out that the low energy-consuming products they have much less storage volume and they are more expensive so that...you don't get you money back on the energy saved....In addition you get less place to store.....if you are used to storing 220 litres and suddenly there is only enough room for 160 litres, food will be placed outside and ruined....."

" ...this really low energy-consuming refrigerator....suddenly there is a problem because the tenant calls me and say – What kind of trick is this, this product is much smaller and we can't get anything inside!- Well what do we do. Well we don't replace it but we visit the tenant and ask – Can we have a look in you fridge? And then we remove the ketchup bottle, the mustard and the tins – Why do you have these in the fridge, you are not supposed to? Eventually we have arranged thing in a way that they accept ..... we have produced a brochure informing what not to store in a fridge because people store.....and sometimes I also store unnecessary products in my fridge and then you cannot cope with the new low energy-consuming one."

The person representing perspective 5 (the latter citation) is unique in his focus on precaution and active use of a precautionary principle. The Haugland and Grönhaug model do not offer any help in understanding the difference between receivers as it appears when comparing perspective 4 and perspective 5. However, the person representing perspective 5 can be said to reflect consumer preferences (at least the preferences of health cautious consumers) to a greater extent than those representing perspective 4 can. Their focus on documented risks make them less sensible to risks associated to substance content that cannot be documented or have not been documented.

The person representing perspective 5 learns us that new thinking and fresh ideas are necessary in order to reach the aim of the Nimbus project *to promote more ecoeffective products and services in the Nordic industry through implementation, testing and further development of a common Nordic system for Environmental Product Declarations (EPD) based on ISO 14040-43 standards.* Within an EPD system there is a need not only for a common standard and the establishment of a basis enabling the judgement of environmental performance but also for new approaches and solutions to specific needs and functions. The different ways to handle problems related to a low energy-consuming refrigerator provides an interesting example showing that new thinking is crucial to the acceptance of products having better environmental performance. Speaking in terms of paradigms, it is probable that the business community to a large extent still belong to a paradigm where environmental aspects are weighed against cost, function and customer needs. Costs, functions and needs are not questioned but regarded as objectified in the sense that they cannot be influenced by actors in the system. Perspective 5 however makes us see that within a truly sustainable paradigm costs, function and needs are questioned and adjusted to environmental aspects when necessary.

6. Recommendations

A second aim of this study is to make recommendations about how to facilitate an understanding for, and effective use of EPD systems. The recommendations below are built on the crucial aspects of communicating EPD systems presented in section 5 and relate to one of the sub-purposes of Nimbus to p*resent user-friendly formats and instructions for use of generic and sector specific EPD systems.* The recommendations formulated here relate mainly to the generic level of a common Nordic EPD system. The representation of companies in the focus group interviews as well as in the personal interviews were primarily based on an interest on behalf of the companies themselves to participate in a discussion about EPD related information. Therefore one mustn't disregard the possibility that companies less environmentally concerned, or companies representing industries with little environmental pressure, are not included in the study. For this reason sector specific recommendations cannot be made. Instead the

recommendations are made on a general level, i e suggesting how EPDs can be made more user friendly by adding certain characteristics as visualised information etc.

* The results from this study suggests that declarations of contents providing information on the chemicals content of products are to be mandatory in a common Nordic EPD system. There is support for this suggestion in recent literature in the field. (Naturvårdsverket 1999; Jönsson 2000).

* The results from this study indicate the importance of closing the gap between the supply and demand of environmental information. The mismatch between the kind of environmental information producers supply and the information corporate customers need (Jönsson 2000) is represented in this study as differences in how senders and receivers understand environmental information. Within a common Nordic EPD system efforts must be made to overcome this problem by;
a. investing in information activities aiming at bringing corporate customers/receivers closer to the position of producers/senders, and
b. investing in describing the information needs of corporate customers/receivers before formulating product/sector specific rules, aiming at bringing producers/senders closer to the position of receivers.

Information activities within a common Nordic EPD system should have the purpose of educating users about the system as such, as well as about LCA methodology and use. Information about the system includes the spreading of knowledge concerning aims of the system, procedures, certification, trustworthiness, and possibilities to influence the system etc. It includes a description of the subjective elements of EPDs. Information about LCAs includes simplified descriptions of parameters and environmental impact categories in relation to effects on health and the environment. It also includes descriptions how to use an EPD for the purpose of comparing the environmental performance of alternative products, (which is built on the assumption that average values or threshold values are included in EPDs). The information suggested here should provide users with enough knowledge to answer the questions; What is an EPD? What does EPD related information mean?

Information activities should preferably be the responsibility of a Nordic counterpart to Svenska Miljöstyrningsrådet. Information activities should be more active than merely updated information on the Internet. Information packages for specific groups, e g salespeople are recommended, as well as instruction packages for key persons responsible for EPD information.

The description of customer information needs should aim at systematically mapping out the kind of information customers within given industries require in order to use EPDs for comparative purposes. There exist within the Swedish EPD system some activities (intressentmöten) aiming at the establishment of support of different actors before the adoption of PSR, product specific rules (Miljöstyrningsrådet 1999). Within a common Nordic EPD system it is recommended that IND, information need descriptions are made mandatory as a preparatory step before the establishment of PSR. These IND should aim at collecting data from different groups of customers representing both public interest, the business community, different organisational size etc. Such systematic descriptions will be a safeguard against the risk that only the opinions of a number of big and environmentally concerned customers are reflected in the PSR and the format of sector specific EPDs. INDs will increase the probability for EPDs to be a useful and efficient tool *promoting more ecoeffective products and services* as stated in the aim of the Nimbus project.

* The results of this study suggest that the possibility for users to compare the environmental performance of products and services on the basis of EPD information must be facilitated. In order to facilitate comparisons the EPD format must be made as user friendly as possible. Except for the inclusion of declaration of contents (which is discussed above) this means that;
a. Average values for specific product groups in relation to different environmental impact categories/parameters and/or threshold values, visualised if possible, are included in EPDs.
b. Clarification/visualisation of the relativity of environmental performance in relation to phases of the life cycle are included in EPDs.
c. A common layout format should be established with sector specific possibilities to make company specific comments of a subjective character under separate headings or in appendices.

The EPD presented in the main report of the Nimbus project to a large extent corresponds to the recommendations concerning a common layout format and the clarification/visualisation of the relativity of environmental performance in relation to phases of the life cycle. The four-page format provides room for visualised information, the headings are clearer, and more easy-to-find, than those found in Swedish certified EPDs. Truly user friendly EPDs however require a presentation of *average values/threshold values in connection to parameters as energy use, use of resources, emissions, substance contents etc.* This will enable the user to conclude whether for example the use of not renewable energy for a specific product exceeds the average use of not renewable energy for similar products. A truly user friendly EPD also require *a putting together of the environmental impacts and use of material/resources in relation to the different phases of a products life cycle*. A standard visual presentation on page 1 is suggested that clearly tells the user both what life cycle phase that contributes the most to the environmental burdens connected to a specific product as well as what the environmental burdens for each life cycle phase consist of. Both the presentation of average/threshold values and clarification of the relativity of environmental performance in relation to phases of the life cycle are recommended to be part of a sector specific responsibility and to be established in the PSR.

7. Future research

One area of great relevance for the future development of EPDs as an efficient market communicator is the relation between the perceived objectivity/subjectivity of EPD information on the one hand and the responsibility of judging and /or weighing parameters on the other. Who, within a common Nordic EPD system is responsible for making value choices and weighting in relation to EPDs that are recommended to be more simple and easy to use? This question and many others regarding power of judgement are essential for future EPD systems.

Appendix 1 - Interview guidelines for focus group interviews

Topic 1 – Use of environmental information in general
A. What type of environmental information do you use today?
B. What advantages/disadvantages can you see with different types of environmental information?
C. Do customers demand environmental information? If so, what type of environmental information do they prefer?

Topic 2 – Internal use/communication of quantitative LCA-based environmental information/EPD related information
(internal is here defined as use of this type of environmental information within the organisation for whatever reason)
A. How is this type of information used internally? (from who, to whom, how often, when)
B. What does this type of information mean to internal work/activities? C. What does this type of information mean to different departments (the purchasing dept., the marketing dept., other departments)
D. What are the problems when using this type of information internally?
E. What are the possibilities when using this type of information internally?
F. How do different internal users understand this type of information? (all the users mentioned under B and C)

Topic 3 – External use/communication of quantitative LCA-based environmental information/EPD related information

(external is here defined as use of this type of environmental information outside the organization for whatever reason)
A. How is this type of information used externally? (from who, to whom, how often, when)
B. What does this type of information mean to external work/activities?
C. What does this type of information mean to different departments (the purchasing dept., the marketing dept., other departments)
D. What are the problems when using this type of information externally?
E. What are the possibilities when using this type of information externally?
F. How do different external users understand this type of information? (all the users mentioned under B and C)

Topic 4 – Readability and trustworthiness regarding quantitative LCA-based environmental information/EPD related information

A. How important is a common layout for this kind of environmental information?
(common headings, standard presentation of data etc)
B. How important is the certification of this kind of information ?
(to what degree does the certification affect the trustworthiness of this kind of information)
C. How important is the possibility to add up data concerning this kind of information?

Appendix 2 – Interview guidelines for personal interviews

*For representatives from technical, purchasing and market dept*1. What kind of environmental information do you use in your work?
(concrete examples, what does it mean , how often, to whom , for what reason, how do you feel about etc)
2. Describe what this information means to you?
3. Describe what this information means to your work?
4. Describe how and when you use EPD related information in your work. *(concrete examples, what does it mean , how often, to whom , for what reason, how do you feel about etc)*
5. Describe what EPD- related information means to you.
(show example of Swedish EPD or case – give examples)
6. Describe what EPD related information means to your work/daily activities.
(concrete examples, what do you mean/how does it feel etc)
7. When you communicate EPD related information what is your message?
When you communicate othet types of environmental information what is your message?
8. What are your directives concerning the use of EPD related information/other types of environmental information?
(how do you feel, what does it mean etc)
9. Describe what other uses and users of EPD related information you know of in your company
10. What kind of support do you need in order to use EPD related information more efficiently?
11. What kind of co-operation with other companies concerning EPD system are you familiar with? *(describe, concrete examples)*
12. How important is a common layout for this kind of environmental information?
(common headings, standard presentation of data etc)
13. How important is the certification of this kind of information ?
(to what degree does the certification affect the trustworthiness of this kind of information)
14. How important is the possibility to add up data concerning this kind of information?

For top management representatives.
1. Describe your company's strategy concerning the use of environmental information.
(examples, directives)
2. Describe your company's strategy concerning the use of EPD related information?
(examples, directives)
2. Describe how EPD-related information and other environmental information is used in the organisation?
(who, when, how often, for what reason)
3. Describe what EPD- related information and other environmental information means to you.
(show example of Swedish EPD or case – give examples)
4. Describe what EPD related information means to your work/daily activities.
(concrete examples, what do you mean/how does it feel etc)
5. When you communicate EPD related information what is your message?
6. What kind of support do people in your organisation need in order to use EPD related information more efficiently?
7. Does your company co-operate with other organisations/companies regarding EPD systems?
(describe, concrete examples)
8. How important is a common layout for this kind of environmental information?
(common headings, standard presentation of data etc)

9. How important is the certification of this kind of information ?
(to what degree does the certification affect the trustworthiness of this kind of information)
10. How important is the possibility to add up data concerning this kind of information?

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