

Communicating the Environmental Performance of Wood Products

Tarmo Rätty, Daniel Lindqvist, Tuula Nuutinen, Anders Q. Nyrud, Sini Perttula, Maria Riala, Anders Roos, Lars G. F. Tellnes, Anne Toppinen and Lei Wang



Working Papers of the Finnish Forest Research Institute publishes preliminary research results and conference proceedings.

The papers published in the series are not peer-reviewed.

The papers are published in pdf format on the Internet only.

<http://www.metla.fi/julkaisut/workingpapers/>
ISSN 1795-150X

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Title			
Communicating the Environmental Performance of Wood Products			
Year	Pages	ISBN	ISSN
2012	71	978-951-40-2363-7 (PDF)	1795-150X
Unit / Research programme / Projects			
Eastern Finland/Renewing wood product value chains and timber procurement solutions, PUU/3502 Business networks, innovation and new product and service concepts in wood products industries of the building construction value chain and 50251 Improving market communication of wood products' environmental values			
Accepted by			
Thomas Rimmler, Researcher, 30 March 2012			
Abstract			
<p>The objective of this study is to provide a basis for improving the market communication of the environmental performance of wood products in Nordic countries. The focus is on business-to-business relations. The research questions concern the current state of the art of environmental performance measures, their efficient use, influential hot spots of environmental concerns and gaps between producer and stakeholder perceptions.</p> <p>The study combines an extensive assessment of the relevant literature with an assessment of the views and opinions in the industry today. The sample of 37 interviewed companies was purposively constructed to involve different actors and business strategies. The results of this study are drawn as a synthesis of the literature review and the interviews.</p> <p>The use of EPMs is efficient if grounded on, or resulting in, sustained competitive advantages at the firm or product level. For wood products, this usually necessitates the substitution of wood for materials with inferior environmental credentials. While forest certification is unique to forest products, generic eco-labels, such as green building certificates and EPDs, make it possible to compare the environmental performance of wood with that of other materials.</p> <p>Generic eco-labels such as the Nordic Ecolabel and EU Ecolabel make a claim for relatively better-than-average environmental performance. However, neither is a genuine international or pan-European consumer label. In particular the EU Ecolabel lacks specifications for wood products. Green building certification offers the best opportunities for wood, but these plans could be further developed to take better account of the imputed environmental impacts. EPDs communicate environmental information efficiently, but they are not yet widely used. The introduction of the CE mark for construction products and green building certification will probably increase the motivation to adopt these systems.</p> <p>The responsible and sustainable sourcing of wood constitutes important product information that should be attached to wooden products throughout the whole value chain. Therefore, the industry should promote chain-of-custody certification. Companies that put their stakes on PEFC/FSC and ISO 14001 certificates alone should be aware that these measures may become the minimum requirement in the market in the future. A company that wants to stand out in terms of environmental friendliness will have to accomplish even more</p>			
Keywords			
Environmental performance, Green labelling, Certification, Standards, Communication, Interview study, Literature review			
Available at			
http://www.metla.fi/julkaisut/workingpapers/2012/mwp230.htm			
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Foreword

The motivation for this study grew from the discussions around the implementation of the EU Strategy for the Baltic Sea Region (EUSBSR). Developing sustainable strategies for wood is considered as one of the priorities for contributing to the prosperity of the region. In early 2010 Professor Pekka Ollonqvist and Tarmo Rätty from Metla and Professor Anders Roos from the Swedish University of Agriculture (SLU) were invited to present ideas on how wood products can contribute to sustainable forestry.

The key question appeared to be how to communicate efficiently regarding the environmental performance of wood. In spite of the lively debate around the topic, we found it to be poorly studied, especially from the business-to-business perspective. The first versions of the research proposal were drafted by Rätty and Roos; Professor Anne Toppinen from the University of Helsinki and Anders Q. Nyrud from the Norwegian Institute of Wood Technology (Tretknisk) were soon asked to strengthen the research group.

Our research proposal was accepted as one of the projects of EUSBSR implementation under the common umbrella called the EFINORD flagship. Discussions under the umbrella have considerably developed our proposal and motivated our work toward a research project.

The participating institutions have granted considerable resources for the execution of this study. However, the Nordic Forest Research Co-operation Committee (SNS) grant 112 finally put the project into operation in March 2011. The grant allowed us to undertake a series of interviews across the Nordic woodworking value chain and to run the necessary workshops to coordinate the literature reviews, as well as to compile this report.

As a coordinator of the project, I would like to express my gratitude to my colleagues for their efforts to solve this tricky problem of efficient communication. Naturally, the support from the SNS, Ministry of Agriculture and EFINORD is also greatly appreciated.

This report will hopefully be seen as a fresh start not only for future studies, but also for the discussion on how the environmental performance of wood can be promoted, and what kind of tools businesses and policymakers may have at their disposal to promote the use of responsibly and sustainably originated wood.

Joensuu, March 2012

Tarmo Rätty

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Executive summary

Introduction

The objective of this study is to provide a basis for improving the market communication of the environmental performance of wood products in Nordic countries. The focus is on business-to-business relations, excluding raw material supply from forests and end-consumer markets. At present, there are few generally accepted standards to measure and convey environmental product attributes to stakeholders in the value chain. Moreover, there is a lack of knowledge about the type of environmental information that would facilitate efficient communication when a business faces consumers or another business. The study contributes to identifying opportunities for improvement, e.g. by narrowing the information gaps concerning environmental performance measures, adapting the information content and making use of the best information channels.

The research questions consider different aspects of environmental performance measures (EPMs) and their role in business communication:

- Which EPMs are currently in use?
- How can the industry make efficient use of EPMs to promote wood products?
- Where are the vital hot spots where environmental concerns are most influential?
- Where are there gaps between producer and customer/stakeholder perceptions of EPMs?

Methodology

A broad approach was adopted that combined an extensive assessment of the relevant literature with an assessment of the views and opinions of Nordic woodworking industry stakeholders. The literature study conceptualizes EPMs and offers a background for understanding the links between them and companies' economic performances and defines the main classification principles for EPMs in order to discuss their role in environmental communication. The interviews complement the literature study by highlighting the current situation and the perceptions among Nordic industry stakeholders of EPMs. A sample of 37 companies to be interviewed was purposively constructed to involve different actors and business strategies and should not be considered a random sample of the industry in Nordic countries. The results of this study are drawn as a synthesis of the literature review and the interviews.

Literature study

Business and environmental performance

A given definition of environmental performance is “the results obtained by an organization with regard to its activities that interact with the environment”. The scholarly discussion has been summarized as a corporate environmental performance matrix presenting internal/external and process/outcome dimensions. Hart (1995) justified the natural resource-based view (NRBV) by: “Strategists and organizational theorists must begin to grasp how environmentally oriented resources and capabilities can yield sustainable sources of competitive advantage.” According to the NRBV, pollution prevention, product stewardship and sustainable development are considered to

yield competitive advantage. In our view, pollution prevention also refers to the management of internal processes and product stewardship in the remaining cells of the corporate environmental performance matrix.

A core question for the efficient use of EPMs is whether such measures yield sustained economic gains. Although the message from the reviewed studies is mixed, the literature supports the positive relation between environmental and economic performance in business. However, one must of course pay attention to both the environmental and the economic measures used.

Cox (2010) identified three major types of corporate communication in the public sphere with respect to the environment: green marketing, influencing and aggressive strategies. Green marketing is a common tool, and the woodworking industries usually rely on the generally positive environmental profile of wood. However, they should take account of a wider landscape of environmental communication, involving a more proactive approach to influencing policymakers and the public and to investigating how environmental properties can be used in the competition against other materials.

EPMs in woodworking industries

Environmental performance measures are discussed in three consecutive categories from general rules to specific product labels, such as *scientific or technical standards and general rules, process measures and product stewardship*.

The role of the ISO 14000 environmental management standards is fundamental to the elaboration of almost any EPM. They set generic criteria for how environmental management is assessed, requirements for environmental labelling and declarations as well as carbon footprint calculations, and life cycle assessment (LCA). The standards from the CEN Technical Committee CEN/TC 350 "Sustainability of Construction Works" will play a focal role in the environmental evaluation of buildings and the materials used. The PAS 2050:2011 (BSI 2011) standard is a publicly available specification for assessing product life cycle GHG emissions and carbon footprints.

LCA is a generic scientific method to assess the full environmental impacts of products. The stages in LCAs are explicitly described in the ISO 14040 series standards. The CEN standards provide guides for the execution of LCA for buildings. An important implementation of LCA is the Environmental Product Declaration (EPD). In EU regulation, EPDs are considered as the main source of environmental information for assessing the conformity of construction products.

The key process measures are ISO 14001:2004 and the Eco-Management and Audit Scheme (EMAS). These measures aim to improve organizational capabilities as well as the managerial cognition and framing of environmental issues. The EMAS is a European environmental management system and is considered to be more rigorous than ISO 14001. Both measures are supposed to help companies to improve their financial and environmental performance and at the same time communicate these environmental improvements to different stakeholders.

Product stewardship uses product differentiation to gain sustained advantages. The measures here range from product-specific eco-labels (forest certification) to rating systems for buildings (green building). Measures can also be material-based or take account of a wider set of sustainability criteria (consumer eco-labels).

Two sustainable forest management (SFM) certificates are currently internationally accepted in the Nordic countries: the Programme for Endorsement of Forest Certification (PEFC) and the Forest Stewardship Council (FSC). Both certification bodies also offer chain-of-custody certification for wood products. This is an efficient tool for protecting the relevant parts of the value chain from environmental claims, especially in construction. The FSC and PEFC are often found to be problematic, as consumers generally cannot identify sustainability criteria in forestry and the labels are not comparable with non-wood products.

The Nordic Ecolabel and EU Ecolabel initiatives apply to multiple product categories. A sustainable source of wood is always required. They cooperate with each other in labelling activities, but are managed by independent bodies. The Nordic Ecolabel is limited to the Nordic countries, but it can be used for a large number of wooden product categories. However, the possibilities for using the EU Ecolabel in wood products are currently limited. In common with the PEFC, they are ISO 14024:1999 Type I environmental labels.

Carbon footprint calculations are based on the same principles as the EPDs, and are frequently used as consumer labels. If they are in accordance with ISO 14021, they are known as Type II environmental claims.

BREEAM and LEED are the most frequently used international green building certificates. Generally, the rating tools vary in their scope from single- to multiple-dimensional tools. As a minimum they assess the energy efficiency of a building, although they extend to a number of other sustainability criteria including sustainable sourcing of building materials. New rating tools are currently being developed to take better account of the actual environmental impacts of development.

Results of the interview study

Sustainable forestry certificates (SFM), environmental management systems (EMSs) and the Nordic Ecolabel are generally well known among the firms participating in the study. SFM measures are considered to be mandatory for market entry or to maintain markets, especially in exports and B2B trade. The availability of chain-of-custody certified wood products is still low. EMS certification is also important for export markets. Consumer labels other than SFM are hardly used. Green building certificates are used by large constructors, but their perceived usefulness seems to be low. LCA measures, including Environmental Product Declarations (EPD), are not widely used, but the interviewees considered their role to be a promising one.

The sustainable origin of wood and the ability to document the trustworthiness of company operations seem to be the most important characteristics of EPMs. The competitive or operational advantages of EMSs were not always identified; the proactive use of different measures was identified in a few cases. Non-wood materials are not generally seen as creating competitive pressure.

Certificates are considered to be part of regular managerial practices, but some key actors considered problems with multiple certifications and hoped to achieve cost and resource savings by integration.

The environmental awareness of customers is believed to be rather low, but higher among industrial and public sector customers. The most frequently required environmental documentation is

forest certification. Owners' or investors' interest in documentation is limited, however. Documentation from suppliers is required in the case of chain-of-custody certification only.

Companies do not consider customer benefits to be a driving force of the use of EPDs. They might help in building an image but there are no tangible benefits. Environmental communication is targeted to customers and utilizes EPDs or promotes other environmental aspects, such as recyclability, of wood products. The greatest potential for green marketing is seen in timber construction. Reliance on environmental friendliness alone can prove problematic in a competitive environment, where other materials also try to carry out green marketing.

Quite commonly companies have a written environmental policy statement. The specific goals and priority areas of environmental policies are most often related to raising awareness of the renewable role of wood materials, minimizing the footprint from transportation and developing on-site material sorting and recycling. Work practices and following up of the policy rarely extend beyond what is mandatory for the implementation of EMSs.

With respect to strategies to influence consumers' needs and wants, company strategies are polarized. We found that almost half of the companies act proactively in their strategies for product development. Companies do not actively seek input from NGOs.

According to the interviewed PEFC representatives, environmental organizations' attitudes and slightly differing forest management requirements justify parallel forest certification systems. The competing chain-of-custody certification systems provide benchmarks for each other. The PEFC has recognized that there are no price premiums for individual products. It has cooperated with green building certification bodies; the problems with LEED need to be solved at the international level.

Discussion and conclusions

The use of EPDs is efficient if grounded on, or resulting in, sustained competitive advantages at a firm or product level. For wood products, this usually necessitates the substitution of wood for materials with worse environmental credentials. While forest certification is unique to forest products, generic eco-labels, such as green building certificates and EPDs, make it possible to compare the environmental performance of wood with that of other materials.

An overview of the environmental assessment standards and their application as certificates or labels in the woodworking industries is given in Figure 6.

Certification and labelling chains have three end points: generic eco-labels, green building and the CE mark. These are the tools and markets in which wood competes with other materials. Generic eco-labels such as the Nordic Ecolabel and EU Ecolabel make a claim for relatively better-than-average environmental performance. However, no genuine international or pan-European consumer label exists. In particular, the EU Ecolabel lacks specifications for wood products. Green building certification offers the best opportunities for wood, but the plans could be further developed to take better account of the imputed environmental impacts.

EPDs communicate environmental information efficiently, but they are not yet widely used. The introduction of the CE mark for construction products and green building certification will probably increase this motivation.

The responsible and sustainable sourcing of wood constitutes important product information that should be attached to wooden products throughout the value chain. Therefore, the industry should promote chain-of-custody certification. Companies that put their stakes on PEFC/FSC and ISO 14001 certificates alone should be aware that these measures may become the minimum requirement in the future market. A company that wants to stand out in terms of environmental friendliness has to accomplish even more.

No single wood product, beside construction value chains as a whole, was considered promising for yielding sustained competitive gains. However, the environmental demand from the public sector and the export markets were considered the most sensitive.

The study has explored a wide range of topical issues regarding the use of EPMs, related communication, perceived strategic importance and key areas for development. From the communication perspective, our results suggest that the Nordic wood industry still need hands-on help to develop the role of EPMs in its market communication. Public actions are needed, mostly in promoting production and the use of Environmental Product Declarations and the development of green building initiatives.

1 Introduction

Environmental issues and concerns related to climate change and energy scarcity are attracting public attention in Europe (European Commission 2011a, European Commission 2011b). This development has resulted in increased interest in measuring, monitoring and communicating the environmental properties of consumer goods. In corporate management this development has put the focus on the environmental performance of corporate firms' and organizations' practices (Nawrocka and Parker 2009, Ottman 2011). The forest sector presents the same picture: the extent of environmentally certified forests has been increasing over the latest decade (UNECE/FAO 2011a). The key buying segments are implementing stricter environmental policies for corporate image-building and to pre-empt bad publicity. The environmental importance of the main user of wood products, the construction sector, is responsible for more than 40% of the global energy use and accounts for one-third of global greenhouse gas emissions (UNEP 2009). Hence, environmental performance wood products can contribute to the United Nations Environment Programme's (UNEP) characterization of a "green economy", i.e. "low carbon, resource efficient, and socially inclusive" (UNEP 2011). Discussions are being conducted in different international forums about the contributions and role of the forest sector in the green economy (Forest Europe et al. 2011, UNECE/FAO 2011b). Accordingly, there are reasons to believe that the societal trend will engender a greater demand for environmental performance declarations on forest products.

The objective of this work is to provide a basis for improving the market communication of the environmental performance of wood products in Nordic countries. It provides a basic description of the principal intentions of environmental performance measures and their role in market communication. The main share describes a field study on environmental performance measures in the forest supply chain conducted in Sweden, Finland and Norway.

1.1 The Nordic wood-based value chain

The Nordic countries are important exporters of wood products, mainly to the European markets. Finland and Sweden are currently among the largest exporters of sawn goods and solid wood products in the world, whereas Norway is at present a net importer of sawn wood and solid wood products (Table 1). The forest sector has a more prominent status in Finland and Sweden than in Norway, both with respect to production and in relative measures such as the share of GDP. The markets for solid wood products can therefore be expected to differ between the countries in this study. Whereas the domestic business-to-business and business-to-consumer markets are most important for Norwegian sawmills and wood industries, Finnish and Swedish producers are focused on industrial, business-to-business markets and foreign customers.

Table 1 Forestry and primary processing in the Nordic sawn wood industry, 2010 million m³

	Finland	Norway	Sweden
Total harvest	50.9	8.9	70.2
Sawn wood production	9.5	1.9	17.1
Imports	0.6	0.9	0.4
Exports	5.8	0.5	11.4
Domestic consumption	3.7	2.3	6.1

Source: Metla

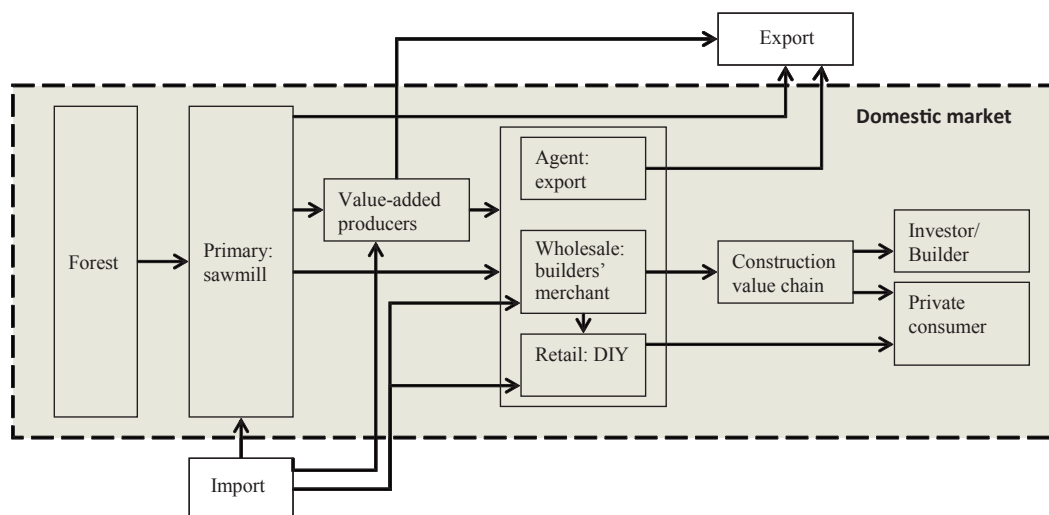


Figure 1 The Nordic wood product value chain, adapted from Nord (2005).

The domestic value chain for wood can be divided into six stages or activities (Figure 1): 1) forestry and raw material supply, 2) primary processing (sawmills), 3) secondary processing (value-added producers), 4) wholesale, retail and export activities (builders' merchants, DIY stores or export agents), 5) construction (contractors and sub-contractors), which serves directly 6) end-users (builders, investors and private consumers). The stakeholders in the various value chain stages include forest owners, loggers, sawmills, wood industry, retailers and selected end-customers such as building contractors, developers and private customers. Key professions such as architects and structural engineers as well as both local and national authorities can also influence the choices and requirements.

An important characteristic of wood products markets is the dominance of business-to-business relationships. Primary producers generally sell to builders' merchants or industries, on export markets through agents or directly to industrial buyers. The share of wood sold at do-it-yourself stores to private end-consumers, although economically promising, is relatively small. Information also flows through the same multi-stage value chain, in both directions. Accurate information exchange will improve the functioning of the supply chain and improve value for customers – including those who depend on the environmental performance of the product. However, in less fortunate cases the relevant information, e.g. on environmental properties, will not reach the end-consumers in a proper format.

1.2 Environmental marketing and communication in the wood-based value chain

Although the need to quantify and monitor environmental product properties and inform customers and the general public about the “greenness” of wood appears evident, the wood industry often faces a more complex situation regarding the execution of these tasks. At present, there are few generally accepted standards to measure and convey environmental product attributes to stakeholders in the value chain. Moreover, there is a lack of knowledge about the type of environmen-

tal information that would facilitate efficient communication when a business faces consumers or other businesses.

The impact of environmental information is critical at the industrial customer's, wholesaler's or retailer's gate, where wood faces competition with other materials. Providers of wood products have to take into account the purchasing policies followed by the customer to secure the environmental performance of the products and publicity that may damage the company's image. These policies are furthermore reinforced by the end-consumer demands or policy requirements in the country.

At present the dominant environmental green-labelling scheme in the sector is forest certification. Forest certification is related to the sourcing of wood from sources that are managed according to certain environmental and other criteria. The application of these standards is monitored by independent parties. Chain-of-custody certification means that the certified material is tracked through the supply chain. The majority of certified firms in the Nordic wood industries are either raw material suppliers or primary processing firms.

Green purchasing behaviour is considered as a complex process that is affected by a wide range of factors: values, product group, type of market and the buyers' position in the supply chain. Green marketing and communication must therefore be evaluated and interpreted in the context of the firm's overall marketing strategy. According to previous studies, European consumers' perceptions of European forest management and wood products are favourable (c.f. Rametsteiner et al. 2007). This sentiment, coupled with the fact that wood products in general exhibit favourable environmental properties (c.f. UNECE/FAO 2011a), offers a possibility for the industry to use green marketing arguments to promote the use of wood products. At present, however, there are very few examples of wood products of which their environmental properties are used in marketing towards end-customers (UNECE/FAO 2011a). This may be explained by a very deliberate strategy – or the concepts and channels to inform about environmental properties not being appropriate.

Different aspects of customers' preferences for wood products have previously been investigated empirically: suppliers' vs. customers' ratings of lumber and supplier performances (Weinfurter and Hansen 1999); lumber quality dimensions (Hansen et al. 1996); lumber requirements among industrial customers at wood treating plants (Reddy and Bush 1998); consumer preferences for indoor furniture (Pakarinen and Asikainen 2001); and preferences for specific applications or species (Dunn et al. 2003, Nicholls et al. 2004, Jonsson 2005, Costa and Ibanez 2007, Nordvik et al. 2009). This research and other studies provide examples of the key features affecting the preferences for wood.

Forest products marketing research has also addressed the question of consumers' attitudes towards certification and their willingness to buy certified wood products (cf. Ozanne and Smith 1998, Forsyth et al. 1999, Bigsby and Ozanne 2002, Veisten 2002, Kärna et al. 2003, Ozanne and Vlosky 2003, Hansmann et al. 2006, Veisten 2009, Aguilar and Cai 2010, Thompson et al. 2010). Ozanne and Smith (1998) identified a segment of consumers in the United States who would probably be willing to pay a premium for environmentally certified wood products. These "green" consumers were described in socio-economic terms as liberal, female and well educated. Green consumer segments were also identified by Veisten (2002) as well as by Bigsby and Ozanne (2002). Anderson and Hansen (2004) and Aguilar and Cai (2010) established that eco-labels on wood products were preferred attributes, but they were generally outweighed by other product properties. In an examination of the factors underlying the preferences for eco-labelled

wood products, Hansmann et al. (2006) found that eco-behaviour was influenced by a sustainability orientation among consumers emphasizing the ecological and social aspects of forests, and by the communication of label information. The research on environmental marketing in industrial settings is definitely thinner.

All the previous studies show a limited overall willingness to pay for environmentally certified wood products, but they also indicate the presence of specific segments of green customers. In this way, the study of consumers' attitudes towards environmentally certified forest products relates to, and illustrates, the broader issue of how consumers react to eco-labelled products in general. Peattie and Crane (2005) gave a critical overview of green marketing, concluding that consumers are (for good reasons) suspicious of green labels. Once customers with green preferences have been discovered, it may be infeasible to characterize these groups in socioeconomic terms. Problems in identifying green customers in non-wood product areas for example were reported by Straughan and Roberts (1999) and De Pelsmacker et al. (2005) and confirmed in several forest products surveys. The evidence suggests that green purchasing is often strongly influenced by attitudes rather than socioeconomic factors (Kaiser et al. 1999, Straughan and Roberts 1999, Diamantopoulos et al. 2003).

Concerning the eco-labelled products, success in communication along the value chain is crucial both for efficient processing and for distribution – as well as for optimal customer customization. This issue has not been considered in detailed scholarly discussions in the Nordic wood industry. Generally speaking, inefficiencies in communication may well also arise from the selection of the media or message to be distributed or the information being transmitted. Several obstacles and pitfalls have been identified when surveying green marketing communication. Peattie and Crane (2005) referred to mistakes in the past that have increased the general mistrust in green marketing and Forsyth et al. (1999) claimed that intentions to buy green are generally exaggerated, for example in survey studies. However, instead of relying on traditional models for marketing communication, one can also make use of a more general approach to environmental communication that sheds light on the context of the communication process (Cox 2010, Rotherham 2011).

The way in which a supply chain works has an impact on how environmental information is passed on. MacFarland et al. (2008) called this supply chain contagion¹; the level at which initial concerns about the environment of the upstream supplier will be passed through the chain depends on the structure of the communication patterns and structures of the supply chain. The integrity of the chain of custody has also appeared crucial; Simpson et al. (2007) concluded that suppliers were found to be more responsive to their customers' environmental performance requirements when increasing levels of relationship-specific investment occurred.

The current state of the art and the market situation emphasize the need to select a wide approach for the study of the efficiency and effectiveness of environmental performance measures, particularly when consideration is made of the communication aspects, the information content and the present diffusion of EPMs in the Nordic wood sector. An enquiry into the issue could help the

¹ MacFarland et al.'s observation was that in the case of "environmental uncertainty and the perceived similarity and frequency of contact between boundary personnel", propagation of inter-firm behaviour from one dyadic relationship to an adjacent dyadic relationship within the supply chain is manifest. Dependence asymmetry has a negative effect on manifest contagion.

sector to identify opportunities for improvement, e.g. by narrowing the information gaps concerning environmental performance measures, adapting the information content and making use of the best information channels.

1.3 Research questions

In the present report environmental performance measures (EPMs) for wood products and their use in corporate downstream and upstream activities are described and analysed. A multitude of EPMs is available and inefficiencies may well arise from a lack of suitable measures or knowledge of how to communicate the environmental properties of wood products and wood in building (Hansen et al. 1996, Rotherham 2011). To serve the purpose of providing cost-efficient information that improves market efficiency with regard to environmental attributes, it is crucial for the communication of EPMs to be focused on the key characteristics. It is therefore relevant to review these measures in woodworking industries and to identify and assess the measures that are currently used for market communication. This study investigates how environmental performance indicators for wood products are communicated at all levels of the supply chain and within corporate internal processes. The focus is on performance in business-to-business relations – although business-to-consumer interactions are also discussed – and the study is geographically oriented to the Scandinavian countries Finland, Sweden and Norway.

Hence, the research questions consider different aspects of environmental performance measures and their role in business communication:

- How is environmental performance measured in the forest products, sawmilling and woodworking industries and related sectors such as retail, construction and furniture?
- Efficiency of EPMs: How can the industry make efficient use of EPMs to promote wood products? What benefits do firms along the supply chain – both suppliers and buyers – find in EPMs?
- Influential hot spots: What are the perceived most vital products, customer segments and stakeholders where environmental and sustainability concerns are most influential?
- Gaps in perceptions: Where are there gaps between producer and customer/stakeholder perceptions when it comes to the sustainability and environmental dimensions of wood products?

2 Methodology

The main research focus for this study involves the classification of environmental performance measures, perceptions of the effective use of EPMs, the most interesting and relevant products for environmental performance information, customer segments and stakeholders for EPM-focused communication, and “gaps” between suppliers’ and buyers’ views on the environmental performance of wood products. Hence, a broad approach was chosen; joining a theoretical literature study with qualitative interviews appeared to be the most suitable method. This approach combines an assessment of quite extensive literature from the last two to three decades with the dominant views and opinions in the industry today. The research approach is shown in Figure 2.

The literature review is warranted by the need to assess the main functions of environmental performance communication in wood products markets. The central purpose of the literature study is to link EPMs with firm performance, define the main classification principles for EPMs and discuss their role in environmental communication. The data of the review are based on a literature search, e.g. on EPMs and performance, principles for EPM and market communication.

The interviews complement the literature study by highlighting the current situation and, even more so, the perceptions among stakeholders of EPMs. The interviews also shed light on the wood industries in Finland, Norway and Sweden. Considering the focus of this investigation on views, perceptions, contingencies and modalities (Strauss and Corbin 1990, Miles and Huberman 1994, Silverman 2000) and an interest in contextual understanding (Bryman 2001), a qualitative approach was selected with forty interviews with value chain professionals in the three countries.

It should be emphasized that the interviewed companies do not constitute a representative sample of Nordic woodworking industries. The selection was purposively performed to involve different actors in the business relations, suppliers and buyers, large-scale and small-scale producers, retailing chains and industrial buyers. The sample also covers different business strategies from companies with a clear focus to companies that cater for the mass market. The companies also range

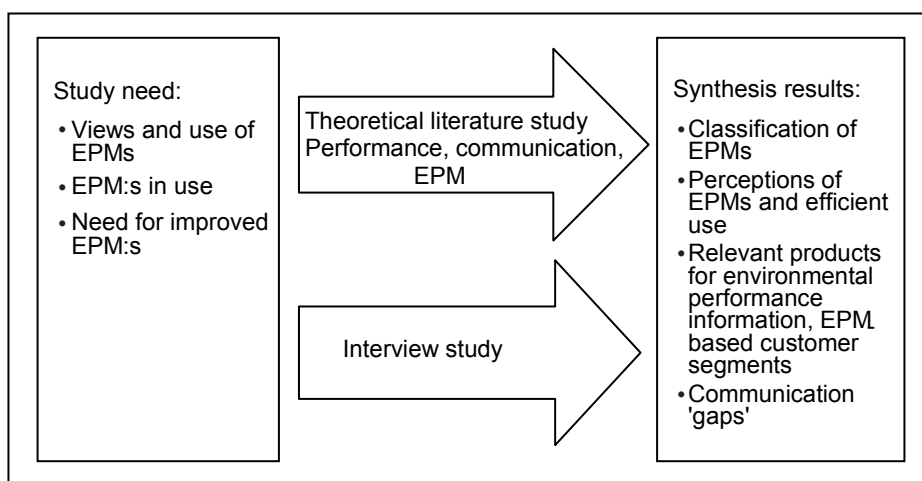


Figure 2 Overview of the research approach

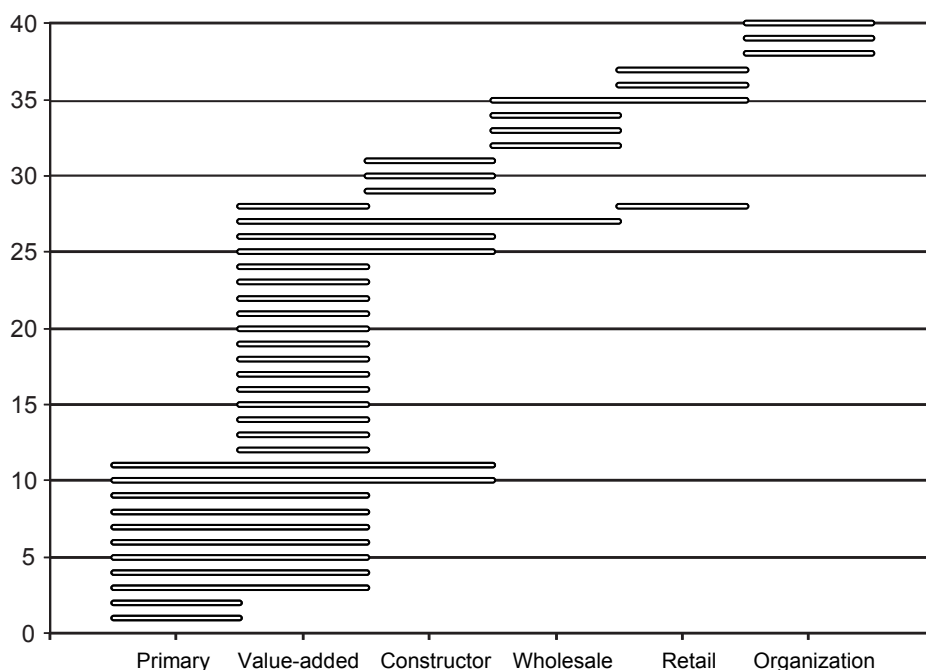


Figure 3 The supply chain phases of the interviewed companies and organizations (n = 40).

from very environmentally aware players to regular production-oriented sawmilling conglomerates. The company-level information is kept confidential. Figure 3 summarizes the value chain profile of the sample. A summary of the interviewed companies is given in appendix 1.

The companies represent different phases of the supply chain: primary producers, value-added producers, construction, wholesalers and retailers. Three of the interviews were conducted with organizations: the Programme for the Endorsement of Forest Certification (PEFC Finland), PEFC Norway and a wood industry association in Finland. When applicable, the wood industry association's responses were accounted for as a value-added company.

The sawmills are classified as primary producers. When a primary producer conducts downstream value-adding production it is classified as both a primary and a value-added producer. The group of value-added producers consists of different types of companies: flooring companies, private house manufacturers, treated wood manufacturers and outdoor furniture and equipment manufacturers. Retailers and wholesalers are considered as one group. The constructors' group covers private house manufacturers, professional constructors and developers.

The company size is also taken into consideration in the sample. The division follows the European Commission recommendation regarding the definition of an SME² However, as our sample also contains larger companies, we call companies with a turnover exceeding 500 million euro as "very large". The counts of companies of different sizes and the main exporting markets are given in Table 2.

² http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/sme-definition/index_en.htm

Table 2 Interviewed companies based on their turnover and main export markets

Company size	Turnover, me	Count	Export markets*	Count
Very large	300+	12	Scandinavia	12
Large	299–50	9	Europe	14
Medium-sized	49–10	10	UK	9
Small	9 -2	4	Transition	4
Micro	-2	2	Middle East	4
Total companies		37	Far East	7
Organizations		3	USA	2
Total interviews		40	Exporting companies	26

* Multi-market companies are recorded several times; the total count equals the number of exporting companies in the sample.

The interview guide involved the following topical areas: general information about the company, EPMs that are known or in use, customers, communication and environmental strategy (appendix 2). Pilot interviews were conducted prior to the larger data collection and some minor changes were subsequently made to the questionnaire. In conformity with qualitative research practices, the interview guide was also adjusted slightly as new information was acquired.

The interviewees approached were persons with overall responsibility for and insight into the company's environmental marketing/purchasing procedures. In the individual cases, their roles in the company varied from CEO, marketing manager or production responsible. In a few cases specialized environmental managers responded to the questions. In some individual cases, the necessary information had to be elicited from two persons in the same company with complementary information on the EPMs in the company (Campbell 2009).

The interviews were mostly conducted face to face, but they were held by telephone in some cases and by email in one case. All the interviews were carried out in the local language and lasted between thirty minutes and more than one hour. They were recorded in Finland and Sweden, and transcript summaries were written down. In Norway the interviewer used written notes. Furthermore, the answers to a set of key questions were assembled in a matrix format allowing easier pattern matching and comparisons across interviewees. To coordinate the procedures in the three countries, meetings were organized before the actual data collection took place, and when most of the interviews had been conducted and the matrix sheets were about to be assembled. The data analysis adhered to the recommended qualitative theme-creating procedures.

3 Literature study

3.1 Business and environmental performance

3.1.1 Environment as a strategic capability

Environmental considerations have filtered into marketing and supply chain management curricula (Belz and Peattie 2009, Christopher 2011). Traditionally, the evaluation of an organization's performance was based on cost, quality, time and service. More recently, environmental performance has been suggested as a new dimension of operations performance (see Jimenez and Lorange 2001).

What is actually counted as environmental performance is not clearly defined in the existing literature. International Organization for Standardization (ISO) 14031 states: "Environmental performance evaluation standard defines environmental performance as the results obtained by an organization with regard to its activities that interact with the environment" (ISO 2007). Thus, EPMs cover general environmental strategies in business, monitoring or auditing of operations, product development and design, certification of the chain of custody or modification of marketing functions, to give some examples.

EPMs must serve an information need to be useful and our study seeks to understand how this information on environmental performance is transferred, whether the metrics efficiently fulfil the information needs and whether the right type of information is communicated.

The stakeholder theory (see e.g. Freeman 1984, Donaldson and Preston 1995, Mitchell et al. 1997) identifies and models groups that have an interest in companies' performance. It formulates methods that can be used to address the "Principle of What and Who Really Counts" for the company, as Freeman put it. Aside from the shareholders, employees and customers, local communities, regulators and, especially if environmental performance is concerned, non-governmental organizations (NGOs) are also considered as stakeholders.

The discussion on EPMs escalated in the early 1990s and scholars have made several attempts to categorize them. James (1994) formulated five main categories of EPMs: *environment focused, process related, business focused, normalized and finally aggregated measures*. The first three categories were further divided into sub-categories. While James's categories are detailed, a more generic framework was provided by Ilinitich et al. (1998). She summarized the works of Wood (1991) and Lober (1996) into a corporate environmental performance matrix based on the main recipients (internal or external) and focus (process outcome), as shown in Table 3.

Table 3 A corporate environmental performance matrix (Ilinitich et al. 1998)..

	Internal	External
Process	Organizational systems	Stakeholder relations
Outcome	Regulatory compliance	Environmental impacts

Both the James and Ilinitch frameworks above are useful for organizing different performance measures in the relevant dimensions; both draw a line between internal and external uses of environmental information. However, as Ilinitch pointed out, the problem with the performance matrix is the strict independence of categories,³ especially in the process and outcome dimension.

Environmental performance does not relate only to goods made of sustainable forest-based materials, as SFM certification endorses. Internal environmental performance categories refer to the use of environmental measures as part of the organizational processes to improve the firm's capacity. External stakeholder relations cover marketing communication, but a wide range of communication tools can be used to improve the environmental performance of a company.

Neither James's nor Ilinitch's framework is directly connected to the theoretical discussions on how a company may gain competitive advantage by using a particular EPM. To achieve this, we have to consider that environmental qualities communicated as EPMs, or the communication skills as such, may constitute key resources. The approach is known as the resource-based view (RBV, see e.g. Wernerfelt 1984, 1995, Barney et al. 2011). The theory emphasizes the role of the firm's own resources and competencies in creating sustained competitive advantage. On this account, the firm must have so-called VRIN resources enduring non-substitutable value, i.e. the advantage must be hard to accomplish otherwise. Rarity, tacitness as well as social complexity are common attributes of resources that contribute to sustained competitive advantage, and in connection with the wood products industry, have been reviewed by Lahntinen (2007).

Hart (1995) raised the natural environment as a key issue in his extension to the RBV, the natural resource-based view (NRBV):

For the resource-based-view to remain relevant, its creators must embrace and internalize the tremendous challenge created by the natural environment: Strategists and organizational theorists must begin to grasp how environmentally oriented resources and capabilities can yield sustainable sources of competitive advantage. (Hart 1995)

He formulated three environment-related strategies for competitive advantage based on resources or capabilities:

1. Pollution prevention

Key resource: continuous improvement to achieve lower costs

2. Product stewardship

Key resource: stakeholder integration to pre-empt competitors

3. Sustainable development

Key resource: shared vision to achieve future positions

Pollution prevention focuses on the necessary developments in production and operations to achieve lower costs. It provides some justification for the use of the process dimension in James's and Ilinitch's categories of EPMs. Hart and Dowell (2011) showed that pollution prevention strategies, imposed as *organizational capabilities or managerial cognition and framing* actually yield financial benefits. Whether the development of processes is internal or external, as suggested in

³ In Ilinitch's words "orthogonal categories".

Table 3, appears to be a less important dimension. For example, Sharma and Vredenburg (1998) found that effective stakeholder integration (a process measure) enabled firms to manage their waste reduction (external measure) and energy savings (internal measure) better. Thus, from the NRBV point of view, process measures make up one conceptual categorization of EPMS aiming for continuous improvement of performance.

In product stewardship, the environment is involved as an “external” stakeholder in product design and development. To gain sustained advantages, firms should pre-empt competition either by gaining access to critical and limited raw material or business locations or by acquiring a dominant position in the market as a playmaker dictating the rules. Inherently, product stewardship generates EPMS that differentiate the products in environmental terms. As environmental issues enter the business at any stage of the supply chain, from raw materials to the disposal of products, life cycle measures play an important role in this category.

Sustained advantages are usually not generated just by using wood. Thus, effort should be put into the products or product lines in which non-substitutable value can be created. Beside the physical properties of wood, the reputation of wood should also be examined carefully. These strategies can be extremely efficient; pre-emption has been used as the disadvantage for wood in Nordic building codes for decades. Fortunately the situation has changed recently: the building codes were adjusted for material neutrality in Sweden in 1995 and in Norway in 1997, but in Finland not until 2011.

Sustainable development as a strategic capability refers to the preparation for future technologies and markets (Hart and Dowell 2011). The level of discussion in this field has remained low compared with that on pollution prevention and product stewardship and has mainly concentrated on sustainability in developing markets, providing a limited rationale for the use of EPMS in Nordic woodworking industries.

3.1.2 Relation between environmental and economic performance

A core question in the business literature regarding environmental performance is whether it is observed to result in any economic gains. While studies on this topic in woodworking industries are rare, with the exception of Toppinen et al.’s (2011) analysis of reporting practices in large companies, we examine the results from the academic business literature and the alternative views to study the issue.

The scholarly discussion on the role of environmental performance in companies’ economic performance grew in the early 1990s (e.g. Porter 1991, Walley and Whitehead 1994). It was motivated by the assumption that environmentally oriented customers would prefer “greener” products. As James (1994, p. 60) put it:

However, many customers do value good environmental performance as part of the overall product mix – particularly if this is provided as a bonus rather than at a premium – and are therefore interested in measures which demonstrate this.

Thereafter, a number of studies tried to discover whether the impact of EPMS on business success is negative or positive – so far with inconclusive results (e.g. Wagner et al. 2001).

The relation between environmental and economic performance depends on the measures used, but also on the way in which the phenomenon is put under the loupe. Wagner et al. (2001) reviewed some studies from the late 1990s on environmental and economic performance. Generally, economic performance can be measured as financial value (e.g. stock market value, Tobin's Q) or financial performance (e.g. profitability or competitiveness) or both. In their view, event studies, i.e. the effects on the share value of announcements of environmental awards or environmental reports (see Hamilton 1995, Klassen and McLaughlin 1996), indicate that bad (good) environmental performance actually causes bad (good) performance regarding stock markets.

Another way to look at environmental performance is to compare alternative stockholder portfolios, one with positive references to environmental performance and one without them. The inherent problem here is ruling out industry-related behaviour; industries that face environmental pressures or that are otherwise particularly prone to admit EPMs may gain different rates of return on assets. For example, Cohen et al. (1997) and Edwards (1998) showed that a number of environmental portfolios outperformed their references, but the difference was relatively small and not always statistically significant.

While none of the event or portfolio studies above rule out a positive relation between environmental and economic performance, the six *multivariate regression studies* over a sample of firms reviewed by Wagner et al. (2001) showed an inconclusive direction. Russo and Fouts (1997) used the resource-based view to test the hypothesis that green companies are more profitable than other companies. The study was conducted on a sample of 243 companies that gained an environmental rating in 1991 and 1992. The authors found that "it pays to be green",⁴ i.e. environmentally rated firms gained a higher return on assets and faster-growing rated firms gained even more.

To summarize, any result on the issue should be treated with caution, as the outcome apparently depends on the model, data set and time period, as well as the performance measures used. Obviously, answers can be best found in homogeneous business environments.

As the results from direct comparisons of environmental and economic performances are indecisive, researchers have turned their interest toward the impact of alternative environmental strategies on economic performance. Generally speaking, a company's business strategy can be either reactive or proactive, and the preferred choice⁵ can lead to different paths of learning and innovation at the business–environment interface and consequently to the accumulation of organizational capabilities (Hart 1995, Sharma and Vredenburg 1998). More precisely, the reactive strategy occurs when companies make changes in their processes after some threat or opportunity has already occurred, whereas the proactive strategy means that companies act before they are under pressure to respond to some threats or new opportunities (Vaccaro 2009). From this viewpoint any strategy that acknowledges the RBV or NRBV is proactive to a certain degree.

The gains of the reactive strategies have been in serious doubt. Gray and Shadbeigian (1993) showed that environmental regulation induced high compliance costs that could be reduced if companies could anticipate and prepare for the regulations in advance. Dowell et al. (2000) found

⁴ This question has also appeared crucial since. Hart and Dowell (2011) pointed out that "the most commonly addressed issue is, whether and under what circumstances it pays to be green".

⁵ One can also consider a continuum of choices. Buysse and Verbeke (2003) reviewed some early studies on environmental management practices that identified generic levels of corporate social responsibility strategies, such as reactive, defensive, accommodative and proactive.

that multinational firms in developing countries proactively adopting single stringent global environmental standards had higher market values than those more reactively defaulting to less stringent or adapting to local rules and regulations.

González-Benito and González-Benito (2005) carried out a detailed study of different environmental proactivity and business performance measures and showed that the relationships must be disaggregated into more specific associations. Consequently, environmental measures were factorized into four categories: planning and organizational practices, logistic processes, product design and internal production management. When the factors were tested in regression models against different business performance measures, it was found that planning and organizational practices did not drive business performance. This observation suggests that investments in environmental management certification probably do not yield any relative gains for the firms. However, the product design factor appeared as a significant explanatory variable for marketing performance, supporting the idea that product stewardship can pay off; in other terms, customers value concrete and objective proof of environmental proactivity that is physically attached to products.

Environmental performance is usually not the core purpose of a firm, but it is still of some interest to stakeholders. This setting gives rise to the so-called agency problem, i.e. how different views of stakeholders' welfare can have an impact on the firm value. Jiao (2010) reviewed the support from previous studies as resulting from two reasons: a negative one because managers tend to please non-dividend-receiving stakeholders due to personal reasons and a positive one because it is considered crucial to the competitiveness and survival of modern firms as an intangible resource, comparable with reputation and human capital as the RBV suggests. Jiao's own econometric experiment with non-shareholder valuations showed that meeting the environmental performance expectations as well as employee concerns has a positive impact on a firm's market value. The result was not shared with product characteristics, however. This does not necessarily contradict González-Benito and González-Benito (2005), as Jiao's product dimension accounted for general quality and safety issues, as well as innovativeness and marketing/contracting, not environmental designs.

The literature above supports the positive relation between environmental and economic performance, and one must pay attention to both the environmental and the economic measures used. Product stewardship appears to be especially attractive, as process measures more often fail to boost the economic performance too. Nevertheless, the reviewed studies have serious weaknesses. Multi-industry studies do not take into account the variation in the business environment across industry sectors. For example, in woodworking industries products are frequently sold to the construction value chain, such that environmental assessment of the wood products takes place as part of a building, a number of intermediaries away from the wood producer. In these cases, any economic gains from the environmental properties of wood can become obscure. Wood is also one of the few materials that carry positive environmental properties, giving one possible source of competitive advantage.

3.2 Environmental communication

Communication is generally understood as a flow of information. However, in its fundamental form it occurs only when the partners also mutually understand a set of symbols. The two drivers of the understanding of the information are the *interest* and the *context*. Actually, most of the theories of environmental communication assume that human perceptions of the environment are

interested (see Milstein 2009). This is to say that communication arises from particular social, economic and political contexts and interests. The contexts and interests help to shape our communication, often in ways that we are unaware of, and direct us to see nature through particular lenses, while also obscuring other views of nature (ibid.).

The variety of interests has a direct impact on the design of marketing efforts. Information flows cannot present binary views of the environmental properties of goods, but they have to be designed to strengthen the beliefs and desires of a particular set of stakeholders. Information flows have to be tailored and targeted to account for the variety of interests.

According to Cox (2010), environmental communication scholars have identified three major types of corporate communication in the public sphere relating to the environment. The first is what we usually consider as marketing the environmental values of goods: *green marketing*. This is the construction of environmental identity for corporate products, images and behaviour. An important discourse usually connected to green marketing is *green consumerism*. This is the case when marketing encourages the belief that by buying allegedly environmentally friendly products consumers can do their part to protect the planet.

The second major type of environmental communication in Cox's analysis is labelled influencing. It consists of industry campaigns aimed at influencing environmental legislation, agency rules and public opinion. Also, Hart (1995) argued that communication can be an efficient component of the *product stewardship strategy* in the NRBV. He considered that aside from exclusive access to raw materials, pre-emption of competitors could be achieved "by establishing rules, regulations, or standards that are uniquely tailored to the firm's capability".

In influencing it is crucial to identify the opinion leaders and decision makers. Several nodes in the wood value chain can act as opinion leaders. The buyers of main builders' merchants, main engineering consultants and constructors and even CAD tool developers may represent such opinion leaders along the wood product value chain. The empirical evidence from agency problem studies, discussed and tested by Jiao (2010), suggests that the question is not only whether managers desire to please some stakeholders, but whether meeting the environmental concerns of stakeholders may have a positive impact on the value of the firm. Fraj-Andrés et al. (2009) found two dimensions (factors) of environmental marketing, strategic and tactical dimensions, of which the strategic dimension refers to practices of eco-design and the use of cleaner or recycled materials and green logistics, whereas the tactical dimension is close to the consumer-oriented concept of green marketing as it involves green advertising, green product lines, eco-labels and environmental sponsorship. While testing a set of hypotheses, the authors showed that the strategic and tactical dimensions have a parallel but independent impact on economic performance. Thus, reliance on end-users' attitudes toward a better environment does not appear to be a sufficient environmental communication strategy; companies should also take account of a wider landscape of environmental communication.

The last type of environmental communication according to Cox's is the adoption of *aggressive strategies* to discredit or intimidate environmental critics. The wood industries have usually trusted the generally positive environmental profile of wood, but counter arguments against logging have been presented. This is in spite of the fact that reputable scientific research has indicated that wood can be used sustainably, such that both increased sequestration rates and increased loggings

are available in boreal and hemiboreal forests.⁶ Aggressive strategies usually originate from rain-forests and/or illegal loggings. It would be risky to suggest how wood producers should react to the aggressive strategies, but reliance on the positive image of wood in a competitive business is not necessarily enough.

3.3 Environmental performance measures in woodworking industries

Toivonen et al. (2008) explored how environmental product attributes were perceived by UK industrial customers. According to the study, environmental quality is seen as an important quality attribute whereby the sustainability of forestry is highly ranked. The study also suggests that environmental quality is multidimensional, which requires good product information from the supplier. The authors called for more thought-through environmental information complementing the eco-labels. This result motivates this part of the present study about the possibilities for producers and vendors to forward their message to their customers. A multitude of individual EPMs and methodological solutions is available. Inefficiencies in markets may well arise from EPMs that are not properly understood or relevant to the customer.

The societal motivation for the measurement of environmental performance comes primarily from climate policy, in which environmental credentials are measured as saving of fossil energy and carbon sequestration. In this regard, the benefits of using wood can gain support from research (see e.g. Gustavsson et al. 2006, Upton et al. 2008, Sathre and O'Connor 2010). The United Nations Environment Programme (UNEP) has developed a tool known as "Common Carbon Metrics" to compare the carbon efficiency of building operations (see UNEP-SBCI 2009). The gains arise not only from 100% renewability of sustainably managed forests as a raw material, but also from substituting fossil energy-intensive materials.

Environmental performance measures are discussed in three categories. First a set of general rules for environmental measurement as scientific and technical standards is discussed. The second group, the process measures, targets improved operational environmental performance. Finally we discuss product stewardship measures. The categorization is not always unambiguous, but generally the hierarchy is bottom up; the first discussed measures can contribute to the measures discussed later and the discussion moves from generic to specific ones.

3.3.1 General tools – environmental standards and life cycle assessment

The object of this section is international standards that contribute to industry practices with respect to the environment. One purpose of a standard is to overcome the technical obstacles to and facilitate international trade by establishing common rules of evaluation, practices or measures. As a difference from certificates and eco-labels, standards do not benchmark the object but give rules on how to benchmark, thus they are usually used to guide such calculations, including when environmental certification is conducted.

⁶ Recent studies show that the economic potential of a stand and net CO₂ emissions are negatively related (see e.g. Routa et al. 2011), at least in boreal coniferous forests. Also, (Kolari 2010) showed that even after a clear cut, a 12-year-old sapling site was at the turning point from the source to a sink of CO₂.

ISO 14000 certificate family

The International Organization of Standards (ISO) is the largest developer and publisher of international standards. Even though ISO 9001 for quality management systems is closely related to environmental issues, we consider here only the family of ISO 14000 environmental management standards as EPMs. Table 4 lists the components.

Most of the generic standards under the ISO 14000 certificates can be used directly or as part of region- or field-specific standards. The direct use of ISO 14001 at the corporate level is discussed in chapter 3.3.2.

A new development in the ISO 14000 family is ISO 14067 “Carbon Footprint of Products”.⁷ It will provide requirements for the quantification and communication of greenhouse gases (GHGs) associated with products. It will also harmonize the calculation methods as well as provide guidance for communication on carbon footprints. The applications of carbon footprints are discussed in chapter 3.3.3.

Table 4 The family of ISO 14000 standards

ISO Guide 64:1997	Guide for the inclusion of environmental aspects in product standards
ISO 14001:2004, 14004:2004	Environmental management systems
ISO 14015:2001	Environmental management – Environmental assessment of sites and organizations (EASO)
ISO 14020:2000, 14021:1999, 14024:1999, 14025:2006	Environmental labels and declarations
ISO 14031:1999, ISO/TR 14032:1999	Environmental management – Environmental performance evaluation
ISO 14040:2006, 14044:2006, ISO/TR 14047:2003, 14048:2002, 14049:2000	Environmental management – Life cycle assessment
ISO 14050:2002	Environmental management – Vocabulary
ISO/TR 14062:2002	Environmental management – Integrating environmental aspects into product design and development
ISO 14063:2006	Environmental management – Environmental communication – Guidelines and examples
ISO 14064-1:2006	Greenhouse gases – Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals
ISO 14064-2:2006	Greenhouse gases – Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements
ISO 14064-3:2006	Greenhouse gases – Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions
ISO 14065:2007	Greenhouse gases – Requirements for greenhouse gas validation and verification bodies for use in accreditation or other forms of recognition
ISO 19011:2002	Guidelines for quality and/or environmental management systems auditing

⁷ The draft international standard (DIS) is already published. The status as of early 2012 is “enquiry”, preceding the “approval” and “publication” stages.

The role of the ISO 14000 series is fundamental to the elaboration of almost any EPM. It sets criteria for how environmental management is assessed, what is required from environmental labeling and declarations, how life cycle assessments should be executed and how greenhouse gases are reported and assessed. Although the list of ISO 14000 tasks includes a large number of standards, it remains rather general; the rules do not deal with industry-specific issues. Such issues are instead dealt with by regional or industry-specific standards.

CEN Sustainability of Construction Works

The ISO 14000 standards are currently being negotiated and implemented in the European wood-working industries. The process is coordinated by the European Committee for Standards (CEN). An important development is the work of CEN Technical Committee CEN/TC 350 for standards of “Sustainability of Construction Works”, scheduled for 2013. Sustainability covers all the three usual bottom lines – environment, social and economic performance – and some main standards for the environmental and social evaluation of buildings have already been approved.

Currently most of the EPDs in the building sector comply with the generic ISO 14020 series. The CEN standards work in accordance with ISO, but they also provide new guidelines for EPDs in construction materials. In the near future, these guidelines will contribute to any practical life cycle, footprint or green building measure to be used in the construction value chain, at least in Europe.

Even if the most immediate contribution of CEN standards is to improving pan-European EPDs, the main contribution of the CEN Sustainability of Construction Works standard lies in providing overall rules for evaluating the *performance of a building* instead of building parts or materials. In this view, upstream producers should look further than the next phase of the value chain; they should set targets for how their products contribute to the environmental performance of the whole building.

PAS 2050:2011

While ISO and CEN standards have been written in consensus among national industrial organizations, the results are usually compromises. The standard specifications are also protected with copyright that denies the purchaser’s right to distribute the standard further. The Publicly Available Specification PAS 2050:2011 (BSI 2011) takes an alternative approach: it “is a publicly available specification for assessing product life cycle GHG emissions, prepared by the British Standards Institution (BSI) and co-sponsored by the Carbon Trust and the Department for Environment, Food and Rural Affairs (Defra). The PAS 2050 is an independent standard, developed with significant input from international stakeholders and experts across academia, business, government and non-governmental organisations (NGOs) through two formal consultations and multiple technical working groups” (BSI 2008).

PAS 2050 can be used not only in calculating the carbon footprints of the firms’ products, but also for guiding the evaluation and comparison of greenhouse gases’ impacts of different designs using a common, recognized and standardized approach. As an open platform, the threshold for applications is lower, but the procedures to reach third-party auditing according to PAS 2050 are still in their early stages. The United Kingdom Accreditation Service (UKAS) has put in place an accreditation system for assessors wishing to certify organizations to PAS 2050.

PAS 2050:2011 and the as yet unpublished ISO 14067 necessarily overlap, even though the documents have been coordinated to some extent by the BSI. The key difference between the PAS 2050 approach and the ISO 14067 approach is that PAS 2050 focuses on providing a consistent quantification method only, whereas ISO 14067 is aimed at providing a standard for both the quantification and the communication of carbon footprints.

Life cycle assessment (LCA)

LCA is a generic scientific method to assess the full environmental impacts of products associated with all stages of their life cycle. The life cycle is usually considered to cover cradle to grave, or cradle to gate, i.e. from raw material extraction to either disposal or reuse of the product, or to the delivery of the product. Obviously the adopted approach depends on the scope of the application. Roughly, for producers illustrating the environmental footprint of their products, cradle-to-gate LCAs suffice, while end-users may also pay attention to the disposal/reuse of the product.

Generally the LCA includes four tasks. In the “goal and scope” the fundamental decisions on functional units (how to relate impacts) and system boundaries (which phases of the life cycle are accounted for) are made, as well as a number of other methodological decisions. In the life cycle inventory data on the inventory of flows from and to nature are created. In the life cycle impact assessment the flows from the LCI are evaluated with respect to the impacts they create. Life cycle interpretation, finally, is a systematic technique to identify, quantify, check and evaluate the results. These stages are quite explicitly described in the ISO 14040 series, giving standardized rules on how to proceed in each stage. Also, CEN Sustainability of Construction Works guides the execution of life cycle assessment for buildings.

LCA studies are demanding. In practice companies rely on LCA providers who have experience with the necessary databases and LCA tools. A collection of providers, third-party databases and LCA tools can be found on the EC “Life Cycle Thinking and Assessment” site.⁸

Environmental Product Declarations (EPD)

Environmental Product Declarations are the environmental measures developed for both materials and products. The fundamental methodology behind EPDs is LCA, thus aside from ISO product labelling and declarations (ISO 14021, 14024 and 14025), the ISO 14040 standard can be used. If the EPD conforms to the ISO 14025 requirements, it is a Type III environmental declaration.

EPDs are basically open documents issued by a producer or an industry organization. The national systems are usually managed by industry foundations. Some current sources of EPDs are listed in *Table 5*.

While comparing the three EPD platforms in *Table 5*, one can see the unsettled international state of the art. Finnish EPDs are relatively short, covering mainly the tabulated environmental impact of resource use and output, whereas the format of the Norwegian EPDs is somewhat more detailed. In Sweden the motivation for producing EPDs appears to be low. Finnish systems have been stalled for a while, waiting for new standards, but in Norway EPDs are updated regularly according to ISO 14025. The German EPDs are detailed compared with the Nordic ones, covering tens of pages of documentation on the sources of information. French EPDs are also de-

⁸ <http://lca.jrc.ec.europa.eu/>

Table 5 Some sources of Type III Environmental Product Declarations

Country	Note	Number	Link
Finland	Partly trilingual	30	http://www.rts.fi/ymparistoseloste/voimassaolevatympselosteet.htm
France	5000 commercial titles	600	http://www.inies.fr/
Germany	Extensive	160	http://bau-umwelt.de/hp474/Umwelt-Produkt-deklarationen-_EPD.htm
Germany	EPDs and more xml database	600	Ökobau.dat
Norway	Norwegian/English	66	http://www.epd-norge.no/?lang=en_GB
Sweden	Managed by miljöstyrningsrådet, international site	a few	http://www.msir.se/sv/epd/ http://www.environdec.com/

tailed; the key information is given as a concise table, but augmented with detailed producer-specific documentation. The key contents of the national documents are generally the same. The information is mainly of interest to professionals; however, simple indicators like global warming potential, embodied energy and carbon are usually easily extracted.

EPDs are, without doubt, the key source of quantitative environmental information. While pan-European practices in the implementation of EPDs are still under construction, it is obvious that multi-market producers have found EPDs a risky investment. Concerning the whole construction industry, a recent CEN standard for core rules of construction products EPDs, EN 15804, enables producers to distribute EPDs according to a common European format. The standard covers three main groups of indicators:

1. Indicators for environmental impacts
2. Indicators for the use of resources
3. Indicators for other environmental information.

Altogether, 22 sub-indicators are listed, not all of which are obligatory in national EPDs. This recent introduction is probably one reason why EPDs have been introduced differently in different countries. Since they are perceived to provide a firm background for producing and delivering environmental information, some European countries have already taken steps to implement EPDs as part of the CE marking of construction products. The need for this is actually declared in EU Regulation No. 305/2011 for the implementation of the CE mark of construction products (The European Parliament and the Council of the European Union 2011, Whereas paragraph 56).

An important implementation of EPD is the carbon footprint. However, not all the footprint measures are particularly tightly connected to the standards discussed here.

3.3.2 Process measures

Process measures are measures used for strategies related to “pollution prevention” (see page 20). This strategy aims to improve organizational capabilities as well as the managerial cognition and framing of environmental issues, usually implemented as an environmental management system (EMS). Two key measures are the International Organization for Standardization’s ISO 14001 and the European Eco-Management and Audit Scheme (EMAS). They both emerged in the middle of the 1990s and soon became the most widely used standards. However, during the last decade ISO 14001 has become the most popular environmental management system. At the mo-

ment about 200 000 organizations in over 150 different countries use ISO 14001, whereas there are only about 4500 EMAS certified organizations.

ISO 14001:2004

The most well-known environmental standard of the ISO 14000 family is the ISO 14001 Environmental Management System. It is one of the most important standards for the wood industries, although it is generic and applicable to any field and level of business as well as organizations. ISO 14001 was established in 1996 and is based on improvement in the management system (Bracke and Albrecht 2007).

ISO 14001 is comprised of five principles: 1) environmental policy, 2) planning, 3) implementation and operation, 4) checking and corrective action and 5) review and improvement (Quazi et al. 2001). It provides guidance in balancing environmental and economic responsibilities and an assurance to stakeholders about the environmental performance of the company. It also helps to deal with environmental regulations and supports the company's environmental communication.

According to a study by Psomas et al. (2011), companies that become ISO 14001 certified because of internal motivation are more likely to improve their environmental performance than those that adopt the system as a result of pressure from the outside. The study also found that companies that adopt ISO 14001 certification require commitment from both top and middle management in order to succeed in achieving better environmental performance.

The ISO 14001 certificate works as an independent and widely used indicator of environmental concern. However, since at least some of these principles also apply to other eco-labels or certificate schemes, it is a convenient starting point for the implementation of the environmental strategy of a firm. For example, PEFC certification requires compliance with ISO 14001.

The environmental impact of ISO 14001 certification can, however, be questioned. As the same rules are applied to any size of organization, firms, public authorities or associations of any field, the criteria to meet the requirements cannot be very specific. These types of contradictions between the anticipated and the experienced gains are one of our interests in the interview study.

EMAS

The EMAS, the Eco-Management and Audit Scheme,⁹ is a European environmental management system launched in 1995 by the European Council of Ministers and it can be used in both private and public sectors.

The EMAS is a voluntary tool and it fits the needs of any size and type of company. It helps companies to improve their financial and environmental performance and at the same time communicate these environmental improvements to different stakeholders. Companies that want to obtain EMAS certification have to: conduct an environmental review, adopt an environmental policy, develop an environmental programme, establish an effective environmental management system, carry out an environmental audit and provide an environmental statement. Compared with ISO 14001, the EMAS is more rigorous and formulates a link between a company and the authorities.

⁹ http://ec.europa.eu/environment/emas/index_en.html

It also requires continuous improvement in environmental performance (Bracke and Albrecht 2007).

The EMAS controls compliance with environmental regulation, the development of environment protection plans and open environmental reporting. It is characterized by authorized auditing by an independent agent.

Since ISO 14001 had become the most common environmental management system in the world, the European Commission launched the EMAS II in 2010, which is open to organizations outside the EU area. Since 2001 it has become possible to integrate the ISO 14001 management system with the EMAS (Bracke and Albrecht 2007). This has improved the opportunities for companies using ISO 14001 to adopt EMAS certification as well. To acquire the EMAS certificate besides ISO 14001, companies need to implement modifications that include continual improvement of environmental performance, compliance with environmental legislation, giving public information through annual reporting and ensuring employee involvement.¹⁰

3.3.3 Product stewardship

Forest certification

Since the Programme for Endorsement of Forest Certification (PEFC) approved four regional programmes (ATFS, CSA, MTCC, SFI), the PEFC and the Forest Stewardship Council (FSC) have become the only widely used sustainable forest management (SFM) certificates globally. The standards behind the certificates are different. Being an ISO Type I environmental label, the PEFC relies on the ISO framework, whereas the FSC is developed in accordance with the requirements of the ISEAL Code of Good Practice for Setting Social and Environmental Standards. The ISEAL Alliance is an international non-profit organization that codifies the best practices of social and environmental standards systems.

The total amount of certified forests in early 2011 was 375 million hectares (UNECE/FAO 2011a). The main development in certification has taken place in Russia, whereas in Western Europe the area is only increasing slightly less than the total area of forest land, keeping the share of certified forest at 51% (UNECE/FAO 2011a). Globally, 9.3% of forests are certified. The sources of certified wood are highly differentiated worldwide, the amount of double certified forests being negligible (about 1%). Also in Nordic countries, wood industry firms are now implementing double certification.

The ambition in Europe to create more responsible wood products is manifested in a concerted European action against the importing of illegal roundwood, the Forest Law Enforcement, Governance and Trade (FLEGT) Action Plan. The main components of FLEGT are voluntary partnerships with exporting countries and a due diligence system in which companies must do their best to ensure legality (UNECE/FAO 2010). FLEGT and SFM certification have worked efficiently; it is hard to find wood products from controversial sources in European consumer markets. Moreover, the EU Timber Regulation, banning the trade of illegally sourced timber and wood products, will enter into force in March 2013.

¹⁰ http://ec.europa.eu/environment/emas/pdf/factsheet/fs_iso_en.pdf

As timber is rarely sold to end-users, the FSC and PEFC offer chain-of-custody (CoC) certification. Basically, CoC certification holders must show the quantity of used wood that comes from certified sources. The FSC gives an option for an “FSC controlled wood certificate” or FSC MIX label, whereby non-FSC wood has to meet 5 of the most sensitive societal and environmental criteria. In the PEFC the share of non-certified wood can be up to 30%, but it has to be declared on the label and suppliers of uncertified raw material should provide self-declaration for their products.

Even if consumers in the developed world can choose certified wood products, the problem appears in their motivation (Kraxner et al. 2009). Consumers do not pay enough attention, as wood products are not usually especially important for their daily life. The low motivation might also be connected to the lack of references. As noted above, illegally sourced wood is practically non-existent on markets; the consumer has no truly bad wooden alternatives for comparison.

Even if there are indications of better economic performance for wood products with SFM certification, verification of sustainable forest management practices and the origin of wood can be useful in professional markets and market communication. SFM certification is an efficient tool to protect the relevant parts of the CoC for environmental claims, especially in construction. Proved SFM also works as a reference for the better-known consumer eco-labels, such as the Nordic Ecolabel and EU Ecolabel.

Green building

The environmental rating of buildings has gained interest since the introduction of the first assessment system for sustainable buildings, BREEAM, in 1990. Ding (2008) listed 20 building performance assessment methods by 2006. The most common certificates are LEED (USA), BREEAM (UK), DGNB (Germany), HQE (France), PromisE (Finland), Minergie (Switzerland), Green Star (Australia), Casbee (Japan) and Certificazione Protocollo SBC (Italy). The first two measures have gained wide international acceptance. These green building assessment tools vary in their scope from single to multiple-dimensional tools. They do, however, generally cover the energy efficiency of the building, although they extend to a number of other sustainability criteria including the sustainable sourcing of building materials. A more detailed discussion on green building is available in Ebert et al. (2010).

The fundamental problem with benchmarking tools is the selection of categories and their weights. The assessment tools usually cover the whole life cycle of the building by using typically fewer than ten evaluation categories, each one with its own set of indicators. Typically, the categories refer to health impact, energy use, water and transportation needs. However, buildings may also earn scores from management practices and innovativeness. The outcome of the benchmarking is typically expressed in three (DGNB), four (LEED) or five (BREEAM, PromisE) categories. None of these certificates specify a benchmark for poor performance, but the categories start from “regular” or “certified” level.

LEED (Leadership in Energy and Environment) and BREEAM (Building Research Establishment’s Environmental Assessment Method) have already established their position as international construction benchmarking tools. As the dominant voluntary programme in the United States, LEED does not restrict the use of different forest certification programmes, but offers credit only for FSC-certified materials. Other green building programmes recognize additional third-party forest certification programmes (UNECE/FAO 2011a). BREEAM has developed an extensive

system called the “Green Guide” to rate materials and construction elements in the UK, but localized versions of BREEAM may use other established LCA tools or databases instead.

A “newcomer” in green building standards is the German Green Building Council’s DGNB (Deutsche Gesellschaft für Nachhaltiges Bauen). The standard is currently being developed for internationalization and has already been adopted in Austria. A catalogue of some 60 criteria constitutes the basis for evaluation: global warming potential, resource efficiency and the use of non-renewable energy are some principal evaluation criteria. The criteria are weighted in accordance with their importance for the particular occupancy profile. Currently 9 profiles are in use. Unlike the main green building certificates (LEED and BREEAM), DGNB takes a holistic view of sustainability. It is possible to increase the weighting of each criterion as much as threefold, or to disregard it entirely, based on its societal or political relevance and its importance for the specific use profile. In practice, this means that if wood is used where its environmental gains really have an impact, this is also accounted for in the assessment. Moreover, the whole life cycle of the building is evaluated, in all its sustainability dimensions.

The ways for woodworking industries to have an impact on environmental benchmarking vary a great deal according to the certification scheme. This is a great challenge to wood product industries, as the positive environmental impacts of wood are easily substituted with other properties and these tools or rules effectively exclude wood of Nordic origin. Nordic export agents have already found the LEED’s exclusive policy on the FSC to be a problem in international competitive bidding. International developers wish to earn category points in LEED, but Nordic wood products cannot contribute. After accusations, the US Green Building Council (LEED) has considered removing the preferential promotion of FSC certification, but finally voted for continuation. Minor changes for non-structural wood have been proposed, anyway (see UNECE/FAO 2011a).

International consumer labels

The forest certificates FSC and PEFC are the only truly international consumer labels for wood products. However, the vast majority of consumers are not likely to identify sustainability criteria in forestry and SFM labels do not compare with labels for non-wood products.

The Nordic Ecolabel and EU Ecolabel are the two most relevant labelling schemes across multiple product categories. Technically, both are associated with the ISO 14024:1999 Type I environmental labelling programme, such that the product environmental criteria, methods to assess compliance and certification procedures follow the international standards. They are managed by independent bodies, but cooperate with other organizations in their labelling activities.

Currently, the Nordic Ecolabel has published labelling criteria documents for more than 60 product groups. Products of relevance to the wood industry include flooring, indoor and outdoor furniture, panels for buildings, buildings, as well as windows and exterior doors. As a general rule the Nordic Ecolabel acknowledges SFM certification standards; usually at least 70% (annual average) of the solid wood must come from certified forests. This is obviously the requirement for any PEFC or FSC CoC certification holder. The Nordic Ecolabel gives further advantages to wood producers compared with SFM certification. The criteria for recycled content in non-renewable materials, production waste management and recycling of disposed products specified for the Nordic Ecolabel clearly improve the relative competitiveness of wood products.

The EU Ecolabel works with 24 product groups. The current coverage appears somewhat lower than the Nordic Ecolabel. One reason could be more burdensome bureaucracy for the EU Ecolabel since the ecological criteria for each product group are decided by the European Commission. Technically, the EC Ecolabel rules operate by materials, such that wooden furniture has already gained its own ecological criteria, but other furniture has not. In the Nordic Ecolabel the criteria for different materials are embedded in the same product group.

The possibilities to use the EU Ecolabel in wood products are currently limited; aside from wooden furniture, wooden floor coverings have gained a labelling option. However, the EC has already launched a pilot study that targets the introduction of an EU Ecolabel for buildings¹¹; the scope appears to be first in office buildings.

Carbon footprints

Carbon footprints follow the same principles as the EPDs, but the coverage is more limited. While the international environmental labels discussed above generally require a third-party assessment for compliance, at the product or the company level, self-declared environmental claims may well suffice. If the assessment is made in compliance with ISO 14021, these are also known as ISO 14021 Type II environmental claims.

The ISO 14067 carbon footprint standard is still under development, thus currently PAS 2050:2011 is the only standard ensuring conformity. The key difference between the ISO and the PAS framework is that the ISO standard is voted, and thus is necessarily a compromise over a wide spectrum of stakeholders, while the PAS procedures rely on a more limited expert working group.

Very few of the wood product companies have the resources to make their own footprint calculations, leaving the field open for environmental consultants. The ISO and PAS standards provide the principles for the calculation and the general requirements for the data. However, the locally adjusted (e.g. Nordic) data are generally missing. The main wood-related LCA databanks refer to European or US data and the data conformity between these databanks is often poor.

To compile footprints as a realistic choice in environmental communication, one needs a firm local database that is connected to national data formats for construction. These formats link environmental data with budgeting and building information models, making them applicable to decision making. The database itself should cover all the relevant construction materials and processes. This development is already halfway as European standards for construction products EPDs have already been published. However, integration with decision making is still in its early stages.

Normalized measures

Instead of making absolute statements regarding environmental metrics, James (1994) suggested that normalized and aggregative measures can generate relevant categorizations of EPDs. The normalized claims of environmental performance usually consist of two related components. The first one gauges any changes in the environment resulting from the products. The second component expresses the reference level. When the reference is a relevant environmental objective, a tar-

¹¹ <http://susproc.jrc.ec.europa.eu/buildings/index.html>

get or a requirement, an eco-ratio is calculated. When resources are used as a reference, the result is an environmental productivity measure.

A productivity measure is a ratio of gained output to used resources; the same rule also applies to environmental productivity measures. A simple but amazingly rare productivity measure in wood product marketing is the price of environmental impacts, though consumers are assumed to perform these calculations implicitly when environmental impacts are reported.

Contemporary productivity research has taken considerable steps, especially in the aggregation of impacts and/or resources (see e.g. Fried et al. 2008). Productivity measures are not tied to the ratio of two variables, but methods exist to measure productivity in multi-output and multi-input cases using a scalar measure (see e.g. Tyteca 1996, 1997). However, environmental performance measurement using pure productivity measures is still in its infancy. They are useful especially for multidimensional policy-making problems in order to identify the processes or products that advance the overall targets the most.

3.4 Synthesis model of the literature study

It is obvious that wood product industries have some specific features that are not captured in multi-industry studies like those of González-Benito and González-Benito (2005) or (2010), but some general remarks can be made.

To clarify our theoretical setting, the discussion in the previous sub-sections is synthesized in a framework with drivers and the implementation of environmental communication (Figure 4). The

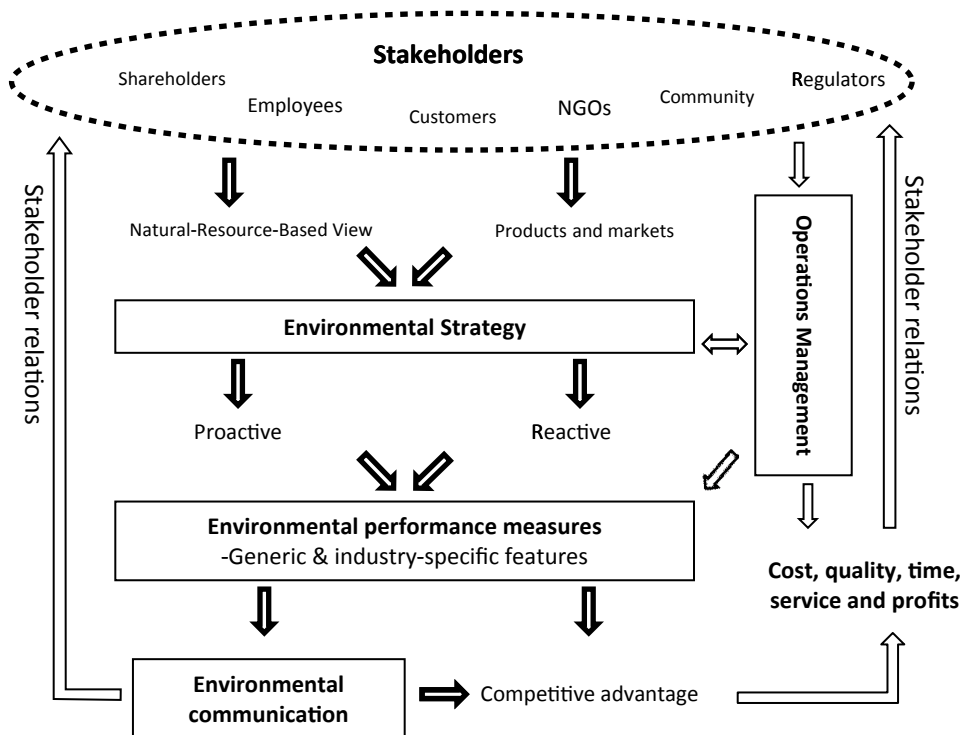


Figure 4 Synthesis model of corporate environmental performance and communication

framed boxes indicate decisions made at different stages. The arrows indicate information flows. Some characterizations of information are also attached as unframed texts, horizontally characterizing alternative contents of information.

The information flows initiate from stakeholders, whose expectations with respect to the company are considered as a resource according to the NRBV. The alternative to the NRBV is that the company reactively takes advantage of the environmental properties of wood without making its own contribution to the use of wood or production technology. In this case the company's own contribution to its environmental strategy is quite limited compared with the former one; the stages are mainly on green consumerism and the properties of wood.

A company has to adjust stakeholders' environmental expectations to other performance goals: cost, qualities, time, service and, as the bottom line, profit. Decisions on raw material procurement and processes interact with the environmental strategy. The adopted environmental strategy is put into action as environmental performance measures. Some of the measures of the implemented strategy are generic, some very wood-specific. We use two categories of environmental performance measures: process measures and product stewardship. The difference between the categories is in the way in which economic and/or environmental gains are sought. However, regardless of the measure, an efficient environmental performance measure should result in sustained or provisional competitive advantages.

It should be noted that the main aspects of EPMS in the wood product industry differ from those in more generic measures. The industry has developed its own eco-labels to increase the trust in the sustainable origin of the wood and its low carbon footprint is seen as a great opportunity. We have to consider a set of EPMS that is quite different from what multi-industry studies have admitted, and at the same time explore opportunities in environmental management that woodworking industries have neglected thus far. Therefore, we will pay a substantial amount of attention to identifying different measures and study the extent to which these are used in the industry. The industry must also consider environmental communication as a separate object. As already described, the Nordic wood value chain involves a range of different actors, whose expectations and actions upon environmental information can make a difference. Since most of the sawmilling products are traded on industrial markets or with large retailing chains, we target our empirical study to business-to-business actors and the communication on environmental measures between them.

4 Results from the interview study

The interview guide for companies covered five different issues. The first part concerning the background information has already been discussed in chapter 2 and appendix 1. The rest of the results are presented here, with those discussed in chapter 5.

4.1 Environmental performance measures

The second part of the interviews concerned the use and perceptions of EPMs by the respondents. Altogether eleven questions were presented to the interviewees. Questions (a–d) concerned how the company maps the available EPMs and what has been the motivation for their use. Questions (e–g, i) considered environmental auditing, EPDs and green building and the last three questions (h, j, k) focused on customers, competitive pressure and the need to integrate EPMs.

EPMs in use and perceived usefulness

In the first question the interviewer presented a list of the most common EPMs and asked the respondent to identify the ones that were used in the company. At least some of the SFM and environmental management systems (EMS), as well as the Nordic Ecolabel, were generally recognized. Primary producers also appeared to be informed about all the EPMs. As green building certificates are mainly targeted to larger construction projects, smaller constructors did not identify them.

In Table 6 the measures are grouped into six main categories. In each cell we indicate both the frequency of managers in firms using an EPM and whether the managers in the companies considered them as the most useful measures (in parenthesis). SFM is used in primary and value-added

Table 6 Companies in the study using EPMs. The number of companies that considered a measure as useful within parentheses.

	SFM	Consumer labels	EMS	Green building	LCA	Other EPM	Total
Primary	10 (6)	1 (1)	9 (4)	1 (0)	5 (2)	1	11
Value-added	18 (13)	7 (8)	13 (8)	2 (1)	8 (3)	7	25
Construction	4 (3)	1 (1)	5 (1)	4 (0)	2 (1)	2	7
Retail	2 (3)	1 (1)	2 (1)	0 (0)	0 (0)	0	5
Wholesale	2 (1)	1 (0)	2 (1)	1 (0)	0 (1)	1	5
Total	25 (19)	7 (11)	20 (10)	6 (1)	10 (5)	9	38

- The last row presents the number of individual companies.

- The columns do not sum up to the total as companies belong to multiple segments.

SFM: Sustainable forest certificates, PEFC and FSC

Consumer labels: Nordic Ecolabel, EU Ecolabel, Green Seal, Blaue Engel, Planet Positive, Rainforest Alliance, RealWood

EMS: Environmental management systems ISO 14001 and EMAS

Green building: LEED, BREEAM, DGNB, Miljöbyggnad

EPD & LCA: Environmental Product Declarations, life cycle studies, footprints

companies, but not that frequently in wholesale. International consumer labels are usually the Nordic Ecolabel; only three companies made use of other consumer labels. The use of the Nordic Ecolabel is more frequent in Sweden and Norway, whereas in Finland consumers might struggle to find any consumer labelled wood products, except PEFC certified. ISO 14001 is the most popular EMS certificate; two companies also reported the EMAS. Twelve of the twenty EMS companies are large or very large.

All the four large professional builders used green building certificates, but only two other companies, a value-added company and a wholesaler, had some experience of green building certification. Swedish companies also used the national green building certificate "Miljöbyggnad".

LCA measures were used mainly by companies that worked in over primary and value-added segments. Taking into account that the use of EPDs constitutes a firm background for evaluating products' environmental performance, it is worrying that aside from two construction companies, only two non-construction companies have used EPDs. Thus, companies' ability to communicate in detail about their environmental performance can be deemed limited.

A rational company uses measures that it considers useful for the business or those that have otherwise been established as a norm in the market. The issue was tested on several questions in the guide, but the figures in parenthesis in Table 6 give the results of the question that considered explicitly the perceived usefulness of the measures used. In the first column, we see that the total figures for the usefulness of SFM measures are in accordance with the use of certificates.¹² Throughout the value chain SFM as well as ISO was perceived as useful, especially when the final products were exported:

At the moment the most useful indicators are PEFC and FSC. The company sells products to the processing industry and their customers require them because they have exports. To be successful, companies need to have forest certificates in use. (A Finnish wholesale company)

In practice, the interviewees' beliefs regarding the usefulness of the Nordic Ecolabel were clearly stronger than their usage, the opposite being true for the EMS certificates. The trust in the usefulness of the Nordic Ecolabel in consumer markets was remarkably strong among the Norwegian companies.

... it might be advantageous to focus on better known labels such as the Swan Label; FSC and PEFC are not well known among customers. (A Norwegian value-added company)

In five cases the interviewees stated that their customers were not familiar with any environmental labels, which was especially the case for SFM certificates.

Most of the large constructors interviewed in our sample were based in Sweden. Because of the problems in Swedish interviews (see footnote 12), the figures for the perceived usefulness of green building certificates probably fail to show the real situation. However, the almost full line of zeros regarding the perceived usefulness of green building shows that very few of the actors

¹² The Swedish companies failed to name any useful measure, not even the SFM certificate they used. Even if the question in the original interview guide pointed out the names of the most useful EPDs, the Swedish interviewees characterized usefulness in very general terms. The obvious misunderstanding of the question is taken into account in the analysis.

in the wood value chain consider the environmental performance of a building as an important guideline for their environmental actions yet, contrary to the CEN Sustainability of Construction Works idea (see the discussion on page 27).

The expressed trust in LCA measures appeared low, but can be considered to be promising. Only one of those with actual experience of LCA, including EPDs, included it as one of the most useful performance assessment methods.

Perceived content of EPMs

Questions b and d concerned the interviewees' conception of important information content in EPMs and how they meet the company's needs. The questions were given in an open form, with no references to the use of a particular EPM or a set of EPMs in a company.

Overall, two issues appeared dominant as important content: the sustainable origin of wood (about 23 companies) and the ability to document the trustworthiness of company operations (about 15 companies). Frequently, both issues were named simultaneously. Third-party auditing was considered an important element of trustworthiness.

In accordance with our observation on the poor perceived usefulness of EMS, only four companies using an EMS considered that supporting operations development is an important part of an EMS. Five companies raised the issue of market entry or keeping the markets as important content. Especially in Finland, the companies found strong pressure from foreign customers to obtain an FSC certificate.

In the construction value chain forest certificates do not play a particularly important role but the managers still see the origin of wood as an important issue. At the moment, however, end-consumers do not ask for forest certificates, but appear to pay more attention to quality issues such as indoor air quality.

The interviewees generally found that EPMs meet the needs of the company and the information related to EPMs is quite easy to find.

However, two contradictory arguments were expressed regarding the perceived need for environmental certification. First, two large international actors pointed out a problem with the use of forest certificates: they require an uninterrupted chain-of-custody. On the other hand, we found several arguments from smaller companies that do not see how to conduct better business with EPMs. Some of them even declared that domestic customers are not interested in the measures. Obviously value-added producers do not fully recognize this possibility of ensuring the chain of custody of those who modify or install the product.

Based on the interviews, producers currently appear somewhat confused concerning green building certificates. They are not yet widely used and the interviewed constructors cast some doubt on the criteria used. On the other hand, value-added producers raised green building certificates as an issue for which more information is needed. They considered the system complex and the related information hard to find.

None of our questions referred directly to the problem of the reactive or proactive use of measures. However, concerning the use, perceived importance and company requirements of EMPs,

very few companies expressed clearly proactive arguments for their use. A Finnish private house producer stated:

With EMS they can operate “the right way”. That is why they got the certificate in the first place.

The certificates meet the needs of the company. They work well and the company can monitor its own operations when using them.

In this particular case some hope is linked to whether EMSs improve the general performance of companies. The level of proactive SFM certification is low, according to the interview answers. Showing the origin of wood helps in keeping or gaining the market positions, but it does not increase the sustained competitiveness of the company in a pre-emptive way as the NRBV suggests. A Swedish constructor’s view of the available gains was rather pessimistic:

No, it is not obvious that labels are good or asked from the company. Many think that their products are already extremely environmentally friendly. Why pay more to show something that everybody already knows? But then, someone starts off certifying and customers think that this is great and then everyone has to do it. So that we would like to see even more such certificates, that is not the case. (Translated)

The cited company used several certificates and labels and the argument was not given in reference to any of those in particular. Similar argumentation was also given by two Finnish companies concerning the lack of business opportunities in question b.

Comments on EMSs, EPDs and green building

Eco-auditing is mandatory at least for the use of ISO 14001, EMAS, PEFC and FSC, thus the vast majority of companies had some level of environmental auditing. It was considered advantageous mainly to improve and benchmark operations. Auditing practices give a good background for improving environmental performance further.

ISO 14001 is the dominant EMS system: only three companies reported that the EMAS was used aside from ISO 14001. Almost all the “very large” and “large” companies used an EMS, with far less interest in smaller companies. One exception was a non-EMS certified constructor and housing developer that acknowledged the gains, but considered that the company’s customers did not ask for EMS certification.

Figure 5 summarizes the incentives for the use of EMSs divided into five categories: 1) competitive or operational advantage, 2) mandatory market needs, 3) environmental concerns, 4) cost efficiency and 5) the level of bureaucracy needed. The number of companies using EMSs was 19, most of which were motivated by market needs and operational advantages. Environment-related arguments gained somewhat less support, but were tightly connected with operational efficiency. More generally, these three incentives were usually given as parallel arguments, indicated in Figure 5 by arrows with the number of cases; cost and bureaucracy arguments against the use of EMSs gained only weak support from the interviewees, mostly from the small ones.

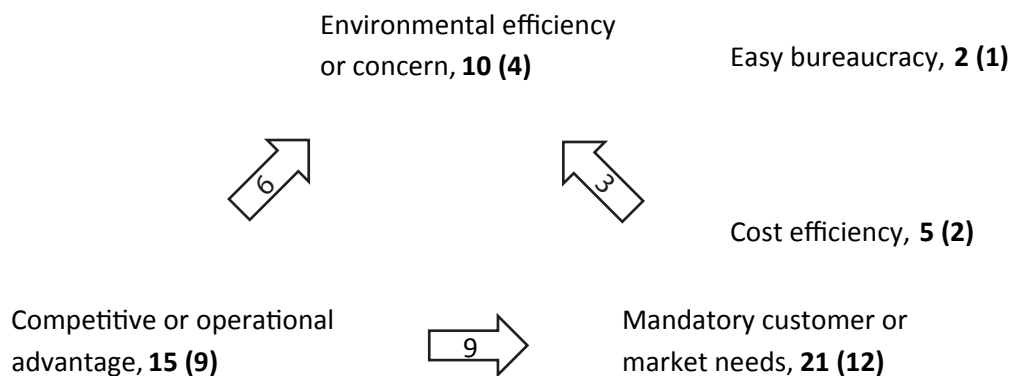


Figure 5. Incentives to use EMSs. The figures after each category show the number of cases in which the incentive was present, and the figures in parentheses the cases in which an EMS was actually used. The figures inside the arrows show the cases in which both incentives were mentioned.

Only six companies used or were working towards using EPDs. Bearing in mind that EPDs are practically the only standardized way to express quantitative environmental information, the figure is far lower than desired.

None of the Finnish companies had green building rated products (other than SFM), while Norwegian and Swedish companies were found to be more prepared in the supply for construction.

In seventeen cases the respondent did not really know about the green building certificates or they had not been under discussion. Four companies found that there is not enough demand among customers. Some of the respondents also considered the information about green building certificates to be complex and hard to find.

Constructors using green building certificates experienced problems in the CoC certification as well as the origin of wood. For example, the products and documentation needed for BREEAM were found to be hard to obtain, at least partly because BREEAM has just been newly introduced in Norway. In Finland three respondents stated that they would like to be involved in green building projects, but have problems with LEED in the use of forest certificates. Mainly large constructors used green building.

Competitive pressure

The interviewees were rather cautious in commenting on competitive pressure between materials; basically all the views for and against were presented, and other wood products were found as the main competitors. The answers from a retailer and a wholesaler indicated the opinions coming from the floor level:

No, competitors do not focus on these issues. (Translated)

To be honest, most of the consumers do not care if wood is environmentally friendly or not. Concrete is not seen as a worse alternative. Consumers don't work like this. The industry should take care of the promotion of wood environmental values; there is nothing we can do. (Translated and summarized)

The environmental arguments given were rather general and familiar. This is somewhat worrying, as the current argumentation on the environmental credentials of wood is not necessarily tenable over time. A constructor expressed this concern rather clearly: “wood competes with concrete, but new materials enter markets”. Also, the attitudes towards and policies on environmental friendliness may change over time, undermining the current argumentation.

SFM and customers

According to the interviewees, forest certificates are more important in export markets than in domestic markets; also, large construction companies require them. There is also some variation between countries, as a company involved with furniture and interiors stated:

The [customer base in the] UK is the most interested in wood issues. Germany about chemicals and forests (palm oil and rainforests). France asks about chemicals too. (Translated and summarized)

In total 16 of 36 interviewees considered either that SFM certification is totally uninteresting or at least that consumers are not interested in it; 22 interviewees considered SFM to be important in exports and B2B trade.

Some of the Finnish respondents noticed that the PEFC has marketed itself in Finland more actively, and as a result customers have started to demand PEFC certified products. However, unnecessary competition between the FSC and the PEFC in all three countries was also mentioned.

Multiple certifications

Most of the EPMs require external or internal auditing. This is especially the case for ISO 14001, ISO 9001 and the CE mark, which consider the company’s overall performance in environmental issues. The issues included in SFM certificates and consumer labels are at least partly covered in these audits. Treating all these audits separately is obviously costly, thus some respondents demanded that companies should consider integrating the multiple certifications.

The problem with the integration of EPMs into the industry routines concerns those roughly half of the companies that have multiple EPMs in use. In Table 7 we see that eight of those companies reported problems with integration. In our evaluation, these companies are also considered as key actors in the wood value chain, operating in primary and value-added production and in construction. The respondents usually hoped that they could combine the audits to achieve cost savings. Double certification of forests was also found to be a problem:

Table 7 Multiple certification companies’ views on the need to integrate systems

Integration	Count	Comment
Works OK	10	5 large or very large companies
With problems	8	7 large or very large companies, primary, value-added and construction
Pass	2	
Total	20	Companies with multiple certification or labels

... It makes a lot of administrative work and addition costs, and frankly speaking we do not get that back from anywhere. From our point of view it would be much easier with a single environmental forest certification label instead of double certification. (Translated and summarized)

Most of those who did not see any problems considered all the certificates as part of the regular managerial practices.

4.2 Customers and suppliers

The third section of the interviews covered the customer relations of the companies. An important topic here is how the wood product companies cooperate with their customers and suppliers and what kind of environmental documentation their customers are asking for. The main customer groups for the companies are listed in Table 8. As it shows, in Finland and Norway the most important customer groups are retailers, wholesalers and industrial end-users. The last group includes companies that for example process timber into windows, garden furniture, flooring or construction elements. The Swedish companies differ somewhat in that their main customer groups are private consumers and industrial end-users. Thus, it seems that the companies interviewed in Finland and Norway have a stronger business-to-business orientation than those interviewed in Sweden.

Environmental awareness of the key customer groups

There appeared to be some differences between customer groups in the extent and type of awareness of EPMs. In general, it seems that environmental awareness is rather low; environmental friendliness is considered as taken. This view was also presented in response to the EPM questions; see the quotation on page 40. In Norway the level of awareness seemed to be lower than in the other countries, although it was thought to be increasing. However, there were some exceptions, and for example a very large building material producer stated that its customers are very environmentally aware and the company undertakes a lot of work on environmental issues, for example by using certified products and making life cycle analysis calculations.

An interesting finding is that environmental awareness appears to be greater among other companies or the public sector customers than among end-consumers. As an example, one interviewee stated that:

Table 8 Main customer groups of the interviewed companies

Customer group	Finland	Sweden	Norway
Retailers	FFFFFFFFFF	SSSSS	NNNNNN
Wholesalers	FFFFFFFFFF	SSSS	NNNNN
Industrial end-users	FFFFFFFFF	SSSSS	NNNNNNN
Public sector	FFF	SSSS	NNN
Private consumers	FFFFF	SSSSS	NNN
Other	4 construction firms	Smaller construction companies	Contractors, private property companies

Professional buyers have a high degree of environmental awareness and they ask about environmental issues. This category includes both the public sector and large construction companies. The professional buyers tend to operate on the basis of a scorecard, and the company has to compete in the framework set out by the scorecard. In the public sector these scorecards are a requirement of the tender system. (Translated and summarized)

Thus, the fact that professional buyers use a scorecard with set criteria that the products have to meet acts in favour of environmentally friendly products.

Other differences in the level of awareness between customer groups were also discussed. Retailers and wholesalers were seen as less environmentally aware than industrial end-users, e.g. manufacturers of prefabricated housing or architects. This is quite a big difference in the perception of the interviewees and the reality of the actions of retailers and wholesalers, as many of the retailers and wholesalers had environmental labels and certificates in use. Retailers and wholesalers were still seen as caring about the origin of wood products.

Another interesting difference in environmental awareness was related to export markets. Finnish companies in particular stated that customers abroad were more environmentally aware than domestic customers. The UK was seen as a remarkably demanding market. Swedish and Norwegian companies did not mention differences in export markets to the same extent, but this could, at least for Norway, be due to the generally lower level of exports when compared with Finland.

Interviewees from all three countries gave enquiries about energy efficiency as an example of how their customers demonstrate environmental awareness. However, some differences between the countries emerged: in Finland, the origin of wood is much more important than in the other two countries, and in Sweden, the use of chemicals and transport were also subject to inquiries. A more radical argument for customer's behaviour was given by a Swedish timber and joinery producer who stated that during the recent recession the company's FSC marked products suffered less during the downturn. This is in accordance with some of our previous experiences of the industry during the recession; buyers have used certification as an additional criterion for screening suppliers. In the long run this may indicate more consistent demand for certified wood and wood products.

Environmental documentation

Many of the companies stated that their customers asked for environmental documentation only sporadically. This could be explained partly by the long duration of many customer relationships. For example, a building material producer stated that they "have long-lasting customer relationships and the level of product knowledge is very high among the customers". The one document that stands out as the most generally requested is forest certification. The PEFC was cited most often, but several interviewees also mentioned the FSC. Thus, it seems that questions about the origin of wood have paramount importance for customers of wood product companies.

The list of other environmental documentation requested is extensive and includes ISO 14001, REACH registration numbers, results of life cycle analysis, RoHS, CARB, M1, ISPM 15 label, VTT certificate, construction sector product declarations, Environmental Product Declarations, Green Dot, LEED, BREEAM and general environmental statements. There was no clear pattern to the documentation that was required.

According to two Swedish constructors, customers did not ask for environmental documentation, whereas investors and shareholders sometimes did require this information. Thus, some investors or other users of houses might see environmental friendliness as being part of the corporate image.

Forest certificates were again deemed the most important product documentation regarding environmental attributes. The PEFC was mentioned most often, but particularly in Sweden the FSC was also repeatedly listed, in one case specified as a chain-of-custody measure. For example, a Finnish retailer and wholesaler stated that it will start to demand PEFC certificates from its suppliers once it becomes certified. Some of the companies pointed out that they require chain-of-custody certification or that the specifications come from a label they use. This was the case for a Swedish furniture and interior producer using the Nordic Ecolabel and setting requirements for its suppliers.

The list of other documentation required about environmental and health-related issues was extensive and included ISO 14001, M1 emission level, CE label, VTT certificate, REACH compliance, documentation related to chemical products (treatments for durability and glue), EMS specification sheet, EMAS and Environmental Lighthouse.

Benefits to customers

It seemed to be difficult for the interviewees to list the benefits their customers have gained from using environmentally friendly products. The benefits ranged from a general “improved image” to more specific ones such as improved market access, larger market share, customer retention and customer relations. There were no clear differences between the different types of companies in their view of the benefits gained by customers.

Cooperating on environmental issues

The main procedure for collecting information about customers’ needs and wants was personal contact. This was the case in all the countries, and is probably due to the business-to-business nature of most of the companies’ operations. Many companies also used customer satisfaction surveys, at variable intervals. The retailers and wholesalers tended to rely less on personal contact and had a more organized approach to studying customer preferences.

A large Finnish retailer was exceptionally innovative in its work on charting customer needs. It had just completed a research project with a Finnish university and the company was currently participating in a project to develop energy-efficient lifestyles.

Most of the cooperation with customers was in product development. A clear majority of the companies undertook such collaborative projects, and for some they included the creation of customized products. In the business-to-business context cooperation in product development would be a natural extension of a business relationship.

Many companies also stated that they cooperated in communication activities, with two of them specifying that they cooperated in market communications. Two other companies cooperated with customers in marketing, which can include other activities besides market communication, e.g. promotional events. Two other companies cooperated in market research. Cooperation in communication or market research might require new ways of working together and thus represent a greater challenge for companies than traditional product development.

Interesting differences were found between the countries regarding cooperation with suppliers. Norwegian companies stood out as having a particularly high level of cooperation with suppliers, which could be explained by the greater share of imported wood in Norway, which could lead to more complicated supply chains. The Norwegian respondents reported cooperation in almost any field of supplier relations. By contrast, Swedish companies seemed the least motivated in cooperation. A building material retailer announced that it was “not particularly willing to relay wishes from customers to suppliers” (translated). It also seemed that construction sector companies, retailers and wholesalers, who generally have more suppliers, tended to be more active in their supplier relations.

A summary of customer supplier relations and the environment

In terms of the environmental awareness of customers, it seems that industrial or public sector customers are more aware than consumers. Environmental awareness among industrial customers appeared to be particularly important in export markets such as the UK. The most frequently required environmental documentation was forest certification, PEFC and FSC. Owners’ or investors’ interest in documentation was limited. Documentation from suppliers was required in only a couple of cases, when it was generally required to ensure chain-of-custody certification.

Companies do not consider customer benefits to be a driving force of the use of EPMs. They might help in building an image but there are no tangible benefits. The interviewed companies mainly collected information about their customers’ preferences through personal contact, which reflects their business-to-business nature. The companies cooperated more with their customers than with suppliers, probably partly due to the generally small number of suppliers. Companies with more suppliers tended to have more systematic cooperation with them. Cooperation took place mainly in product development, but communication activities and other forms of cooperation were also listed.

4.3 Communication on the environment

The attention of these questions was focused on the main target groups in relation to their environmental communication, the communication methods and the opportunities to use environmental information in marketing in the future.

Communication here was rather broadly defined, including marketing and other types of communication. First, the interviewees were asked to name the most important target groups of their companies’ environmental communication. The answers have been grouped together and are presented in Table 9.

The table shows that the companies tend to target their environmental communications to their customers with a variety of other businesses. Some interviewees specified that this also included potential new customers, and it would seem reasonable to assume that the same is implied in many other responses. After all, it is likely that a potential new customer will be more interested than a longstanding customer in the environmental credentials of a company. Consumers and the local community are also targeted fairly often, and in eight instances employees of the company were perceived as a target group. Thus, it can be said that the interviewed companies address quite a large range of different stakeholder groups, although their main target group is their customers.

Table 9 Target groups of the companies' environmental communication

	Primary	Value-Added	Constr.	Whole-sale	Retail	Org.	Total
Customers, B2B	11	25	3	5	5	2	51
Consumers	4	10	2	1	1	1	19
Employees	1	2	2	2	1		8
Partners	2	3				1	6
Shareholders/investors	1	2	2		1		6
Other professional	2	3				1	6
Neighbourhood/ interest groups	4	4	4				12
Env. Authorities	1	4	1				6
Not targeted or no separate env. comm.		3	1				4
Total (companies)	11	25	7	5	5	1	38

NB: Companies can be classified into more than one category, which explains why the total number of companies (52) is greater than the number of the companies interviewed (38)

Types of information communicated

The types of information communicated can be grouped into four categories. Some companies gave examples that fall into more than one category, and they are included in all of them.

The most common types of environmental information communicated were the various *EPMs* – 21 companies stated that they communicate the environmental aspects of products and processes by using for example PEFC and ISO 14001 in their materials. The most commonly used EPMs were the PEFC (11 cases) and ISO 14001 (6 cases). They were followed by the FSC (3 cases), Nordic Ecolabel (3 cases) and Realwood (2 cases). Green Dot and BREEAM were both mentioned once.

The second most common type of environmental information was *environmental statements*, and 16 companies used this approach. The issues communicated include general environmental friendliness and environmental aspects of the product (7 cases), recyclability (3 cases), carbon footprint (3 cases), energy use (3 cases), research and development carried out by the company (3 cases), the renewable nature of material (2 cases) and material use (2 cases). In addition, ecotoxicity, waste management, bio-based carbon chain in a product, durability, carbon neutrality and grouping of environmentally friendly products in the store were all mentioned once as contents of the general environmental communication. The most commonly communicated topics are generally recognized as positive aspects of wood products, although the prominence of energy-related communication is a little surprising.

The last two categories were much less common. Five companies had a predominantly passive approach, where they only had some information on the website or provided it when customers asked for it. Four companies mentioned communications that did not really convey environmental information, for example mounting directions for products.

The companies can also be grouped according to *activity in environmental communication*. It should be noted that the differences between the categories can be somewhat ambiguous. Fourteen companies can be classed as having an active approach to environmental communication. An illustrative example of this type of communication is given by a Finnish primary and value-added producer.

We communicate the environmental friendliness of wood products, carbon footprints and the certificates we have in use. We want to direct the environmental communication towards end-consumers. This way we can also create pressure towards retailers. (Translated and summarized)

A passive approach was adopted by twelve companies and this is exemplified by a Swedish firm.

Well, it depends. It's there on the product, and we use some of the information for those who are interested. But surely, no customer wants to have all the information. (Swedish timber and joinery producer, translated and summarized)

A neutral approach falls between these two approaches and was used by ten companies, for example:

We use PEFC in every product, in the wrappings and in our brochures. We don't really communicate any other environmental aspects to buyers. (Finnish sawmill, translated and summarized)

Thus, the interviewed companies' use of a variety of means of communication, as well as a range of approaches to communication, is apparent.

Communication channels

The most frequently used information channels are presented in Table 10.

The dominant communication channels include advertising, websites and brochures. Probably due to the business-to-business nature of the operations of many companies, personal selling and product presentations and fairs are also important channels. However, it seems that many companies use a wide range of channels in their communication.

Table 10 Channels used for environmental communication by the companies.

	General communication	Environmental communication	Reviewing suppliers
Advertising, websites, brochures	36	31	13
Sustainability report	17	17	7
Product presentations, professional fairs etc.	31	22	4
PR-type communication	22	18	0
Personal selling	33	21	18
Social media (e.g. Facebook, Twitter)	14	8	1
Public announcements	23	11	4

The smaller numbers for environmental communication are partly explained by the fact that several interviewees, particularly from SMEs, stated that environmental communication was part of general communications and thus they did not discuss this separately. The differences between the categories are greatest in the cases of personal selling, product presentations and fairs, and public announcements. Thus, environmental communication is mostly used to arouse customers' interest (advertising) or in corporate social reporting, in which it is usually an obligatory element, playing a minor role in personal contact (selling and product presentations).

Many of the interviewed companies reported long-term relationships with their suppliers, and had little need to review them. Several companies did, however, mention that they used other methods for reviewing suppliers. The most common of these were company visits (five cases) and company-specific guidelines or questions (three cases). One company even stated that it first reviews the values of the potential supplier to determine whether they fit with the company, and only then starts potential cooperation.

Best opportunities for green marketing

The last question on communication inquired which products offer the greatest potential for green marketing. It should be noted that due to a clerical error interviewees FIN01–FIN12 were not asked this question. Nevertheless, the answers we received offer interesting insights.

The greatest potential area for green marketing seemed to be in timber construction. Eight interviewees raised this as an opportunity, either in detached houses or in multi-storey houses. A constructor and developer expressed the argument as:

Because there is so much talk about carbon dioxide and concrete uses a lot of carbon dioxide, it could be an advantage to build wooden frames. That is where there is potential for growth. For example, wooden windows and floors are already commonplace, and the next big thing would be to go into the frame system and start building them out of wood. (Translated and summarized)

Interior products, e.g. floors or kitchen furniture, were mentioned by four interviewees as potential categories, whereas five pointed out other specific products that would offer potential. One company thought there would be opportunities in developing supplier relationships, and another that targeting environmentally friendly customers would be a good solution.

Seven interviewees thought that all their products or even all wooden products are inherently environmentally friendly and as a result could utilize environmental communication. A Norwegian value-added producer with a wide range of products provides an example:

All our products are equally good. There is a need to educate end-users about what makes products environmentally friendly, as the end-users' comprehension about what makes a product sustainable does not comply with wood products' properties. (Translated and summarized)

This approach, while understandable, might be problematic in a situation in which wooden products face pressure from competing materials. It would be necessary to think about the areas with the most potential, as well as the areas that need improvement, rather than to rely solely on the inherent environmental properties of wood, which might not be obvious to customers. The issue

of competitive pressure from non-wood (see page 41) is clearly connected to opportunities for green marketing.

To summarize, the interviewed companies mainly target their environmental communications to their customers, but have also recognized other important groups. Many SMEs do not have separate environmental communication, but rather include it in their other corporate communication. Environmental communication mainly utilizes EPMS, or promotes other environmental aspects, such as recyclability, of wood products. The greatest potential for green marketing was seen in timber construction, but many companies thought that wood products are inherently environmentally friendly and could be marketed with environmental arguments. This might prove problematic in a competitive environment, where other materials also try to engage in green marketing.

4.4 Environmental strategies in companies

The last part of the interview guide related to the strategic role of environmental issues. The target is the company's environmental policy and refers to the way in which it takes environmental impacts into consideration when new products or processes are called for.

Environmental policies in Nordic wood industry companies

It was relatively common among the companies in all three countries to produce a written environmental policy statement. However, not all the respondents were convinced that all their employees would be fully aware of its contents. Wood product divisions in a couple of large companies were also in the process of developing their specific environmental policy statements, but at the time of the interviews they were reluctant to open up the content of this new policy. The specific goals and priority areas of environmental policies were most often related to raising awareness of the renewable role of wood materials, minimizing the footprint from transportation and developing on-site material sorting and recycling.

Illustrative examples of the content of an environmental policy can be drawn from the interviews with the environmental manager of a Swedish wood products retail company, the Finnish value-added producer and a construction company interviewed in Norway, respectively:

We have three general goals. (1) Increase sales of "green selection" products. Our products are the most important environmental resource. These are what are transferred to the customer. (2) We shall reduce transport costs, which will reduce our CO₂ emissions; previously, we owned all lorries, but now we are using contractors who own a more modern fleet. (3) And we have also set targets to reduce our waste to landfill. Waste handling has huge environmental significance, and it is easy for us to manage this correctly. For many, environmental management is about waste sorting and recycling. We want to become better at sorting our waste and reducing costs.

The key features of environmental strategy are life cycle thinking, sustainable development and taking care of the environment in our own operations. They are monitored by measuring and reporting, e.g. emissions from transportation.

Have an environmental policy: take care of local flora and fauna, think sustainable, traceability of wood and stone, own ethical guidelines. We have developed an own tool for

follow-up work called “the travel to the deep green”. We rate building projects on energy, climate, materials and water from vanilla to deep green in a matrix. This is for visualization and to measure if they are improving.

The question “How is the environmental policy applied to work practices?” seemed to be connected most closely to ongoing and past employee training in conjunction with the ISO 14001 system, or to raising general awareness of the environmental friendliness of the companies’ products through internal customer support training. The question “How is the policy followed up?” did not produce very concrete examples of active follow-up work beyond what is mandatory in companies with ISO 14001 auditing.

Stakeholder orientation

Stakeholder orientation has been viewed as a broad philosophy that includes ethics and social responsibility in managerial decisions (Ferrell et al. 2010). This broadening of customer orientation to focusing on multiple stakeholders has important implications for firms. Orientation to the diverse interests of stakeholder groups is central to strategic planning, and failure to address the interests of multiple stakeholder groups can negatively affect the company’s reputation and eventually even its economic performance through decreased customer retention. According to the interviews, the most important stakeholders mentioned were customers, suppliers and environmental authorities. Sometimes it was not completely certain whether the respondents were actually ranking different stakeholder groups from the perspective of environmental issues, or assessing the overall company’s stakeholder groups. In the smaller ones, managers sometimes had trouble with the identification of the whole spectrum of stakeholders beyond suppliers and customers, a similar finding to that found by Li et al. (2010) regarding the CSR perceptions of Finnish SME sawmill managers. The following quotes represent some interesting differences in the answers regarding the importance of stakeholder groups:

Journalists, forest owners are not proactive and do not respond to market demands. This is not how environmental problems should be solved. (Timber and interior wood producer)

Local environment (the community where the factory is situated), employees, customers. (Treated wood producer)

The most important stakeholder groups in terms of environmental issues are authorities, communities, construction firms and end-users. (Private house producer)

Hard to say, several stakeholders are equally important. End-consumers play a key role. So also do local administrations and politicians. And the owner/planner is very important. One may say it is these three categories are our main stakeholders. (Constructor and developer)

The most important stakeholders are certifying organizations, auditing firms and NGOs. (Primary and value-added producer)

The question “Does your company invite input from environmental NGOs when making environmental business decisions?” did not produce any replies that would indicate that firms or wood product strategic business units within the large pulp and paper companies actively seek input

from ENGOs in conducting business planning or new product development, although NGOs are in general viewed as a key stakeholder group.

Role of environmental friendliness in new product development

From the new product and service development point of view, we examined how companies assess environmental impacts when designing new products, implementing services for new or existing products or developing production processes.

With respect to the development of new products and services with a high level of environmental friendliness, constant improvement was expressed as a target in large companies but a lack of resources was expressed as a barrier to improvements among SMEs, which also lacked specific processes regarding environmental friendliness in operations and products. The most commonly mentioned areas for improvement were dealing with improved material and energy efficiency, minimizing transportation distances, using local suppliers and replacing tropical wood with domestic origin wood. Minimizing the water footprint in the production process was also mentioned by a few companies. While some companies either did not express active interest in new product development or did not consider environmental performance to be a concrete part of it, some more environmentally active respondents could still be found, as illustrated by the following quotes:

We conduct a risk assessment and examine opportunities; environmental issues are included here and we carefully analyse consequences (of different decisions).

The assessment of environmental impacts is a part of the product development and in production the environmental impacts are taken into consideration.

... Environmental issues feature quite heavily in product development, e.g. the decision to use wood and requirement for safe surface treatments.

Environmental impact of wood products is taken into consideration in product development. The use of TMF preservative treatment is favourable. We would like to take responsibility for making customers more environmentally conscious.

Strategic orientation

In our interviews, we inquired about managers' intentions to redirect consumers' needs and wants towards less material and energy consumption and fewer CO₂ emissions: less environmentally harmful consumption or any other related aspect. We used the responses as the main illustration of company proactiveness towards environmentally related strategic orientation. Based on the interviews, proactiveness could be interpreted as being present most commonly in the group of Swedish companies (emphasized strongly in five interviews), followed in the relative frequency by Finnish companies (about half could be considered as being proactive, including small and large firms) and then in three Norwegian companies, which expressed views that can be interpreted as being proactive. These findings should not, however, be generalized beyond the sample since there was a high degree of heterogeneity in terms of the companies' core business areas, target markets and size. Also, many respondents quite frankly answered just "no", without any further elaboration of the underlying reasons, so based on the interview data it was difficult to see beyond this negative attitude. A more indirect example from a Finnish value-added producer also illustrates a lack of will to redirect customer needs actively:

The company is not that interested in redirecting customers' needs and wants toward less environmentally harmful consumption. We hope that the pressure to that comes from somewhere else.

However, more proactive examples were expressed for example by a Swedish value-added and a Norwegian industrial end-user company:

When we design and develop our products we always consider the environmental impacts. We design our product in a way that all parts are possible to recover.

Yes, we would like to influence customers: decrease use of packaging, adjust orders making it possible to minimize transport. Suppliers: EMS, for example choice of surface treatment.

From the corporate strategy perspective, it is of interest to question whether the growing pressure towards environmental performance is driven by their customers, competitors or other stakeholders. According to our interviewees, the main drivers of the use of EPMS are customer requirements (particularly in certain export markets), the fulfilment of corporate internal information needs (associated with auditing or sustainability reporting) or their strategic decisions to act responsibly. There were also increasing specific information needs arising from for example institutional builders in certain markets, particularly in the UK. Competitive pressure from producers of other construction materials seemed to play a minor role, which is contrary to the evidence from some media clips or general folk wisdom lurking in the collections of Nordic wood product suppliers.

4.5 Views of the forest certification bodies

To determine the state of forest certification and the labelling of wood products in the Nordic countries we interviewed PEFC Finland and PEFC Norway. The interview guide is in appendix 2. At the moment there are about 135 PEFC certified companies in Finland and 32 companies in Norway. According to the marketing manager of PEFC Finland, the majority of the certified companies in Finland are primary producers. Most of them are export-oriented sawmills. It seems that forest certificates are important for large companies. These companies need to consider their reputation and they need to be able to prove the origin of wood. However, there are differences between the countries.

We asked the respondents at the PEFC what the main similarities and differences are between the parallel certification systems PEFC and FSC. Besides the fact that the forest management requirements are slightly different and that environmental organizations do not currently accept the PEFC, the interviewees were unable to present any other justifications. However, the competition is not necessarily a negative issue. As the interviewee in PEFC Finland stated, "In this case, monopoly would not be the best option. This way the certification systems need to develop themselves all the time." There are no big conflicts between forest certification systems. According to PEFC Norway, "PEFC is in line with other environmental goals. The conflicts related to FSC and the Norwegian PEFC standard is that FSC does not allow non-domestic tree species to be planted." The product policies of the certificates also differ, giving benchmarks to each other. According to the interviewee in PEFC Norway, "FSC has been active and has created a need for forest certification also in flooring and in products for outdoor use."

The PEFC sees the EU timber regulation as an opportunity to increase the use of certified wood products. It will come into force in 2013 and will prohibit illegal timber in the EU area. Both bodies consider the increasing wood construction as an opportunity to use forest certificates in the marketing of wood products. They also agreed that end-consumers do not recognize the label. In the future the best opportunities to use the PEFC logo will be in products for which consumers value the environmental attributes. PEFC Finland has started a marketing campaign and has marketed itself actively in Finland.

At the moment different products are labelled with the PEFC logo. In Finland, the logo is common on timber products. There are also more printing products, such as magazines, brochures, disposable plates and cups, interior panels and packaging material carrying the PEFC logo and PEFC-labelled furniture will be introduced in Finland. There are big regional differences in Europe. Some magazines carry the logo as well as consumer flooring products in the Netherlands. It seems that the end-consumers in the Netherlands and the UK demand forest certificates, whereas the consumers in Nordic countries do not.

Companies considered the information related to green building certificates to be quite complex and hard to find. Some of the respondents also said that they would like to be involved in green building projects, but the problem with LEED is with forest certificates. To achieve points with certified wood in LEED projects, companies need to use FSC certified wood. Both bodies have cooperated with green building certification organizations at some level. The respondent from PEFC Finland stated that “the US green building council does not accept PEFC and therefore companies using PEFC do not get a point in LEED projects. BREEAM on the other hand accepts PEFC in every country. The situation with LEED is still under discussion. The wood construction is about to increase and therefore it would be important for PEFC to become accepted in LEED projects. Green building certificates are a tool for investors to evaluate buildings. The certification bodies want to keep these systems as uniform as possible and therefore they do not easily make country-specific exceptions. This issue therefore needs to be solved in PEFC at the international level.” Even though the PEFC has worked on this issue for a while, progress has been modest.

Many of the respondent companies found it hard to turn forest certification to better business. The interviewee from PEFC Finland recognized that there are no price premiums for individual products. However, “forest certificates are a way to communicate with customers and companies that work in a sustainable manner can reduce risks. Companies can create a positive image and thereby attract customers”. According to PEFC Norway, “forest certificates give full access to the export markets.”

5 Discussion

5.1 Environmental standards, labels and certificates

An overview of the environmental assessment standards and their application as labels in the woodworking industries is given in Figure 6. The rules for collecting the data, calculations and presentation of environmental information usually originate from the family of ISO 14000 environmental management standards. The relevant open standards here are ISEAL and PAS 2050. ISEAL is a code for setting social and environmental standards from a set of NGOs. PAS 2050 is the specification for the calculation of carbon footprints. It is generic, but easily applicable to buildings and construction goods. Also, the ISO standards are generic. The European Committee for Standards (CEN) has written specific standards for construction in accordance with ISO 14000 and ISO 9000. The CEN work on the sustainability of construction works, including Environmental Product Declarations, gives a firm background for the evaluation of buildings and building parts over their life cycle. Carbon footprints are just one aspect of environmental impacts.

When it is not necessary to attach quantitative evaluation to the product, ISO 14024 Type I environmental labels are frequently used. As an exception, the FSC relies on the ISEAL code. Not only the direct environmental impacts, but usually also the implementation of environmental management systems account for the labels. Sustainable forest management certificates and the respective chain-of-custody certificates are specific to wood products and they are frequently required aside from other dimensions in generic environmental labels. The fundamental difference between sustainable forest management certificates and generic consumer labels is that generic labels usually claim relatively better environmental performance than average, whereas sustainable forest management certificates do not make claims relative to other products.

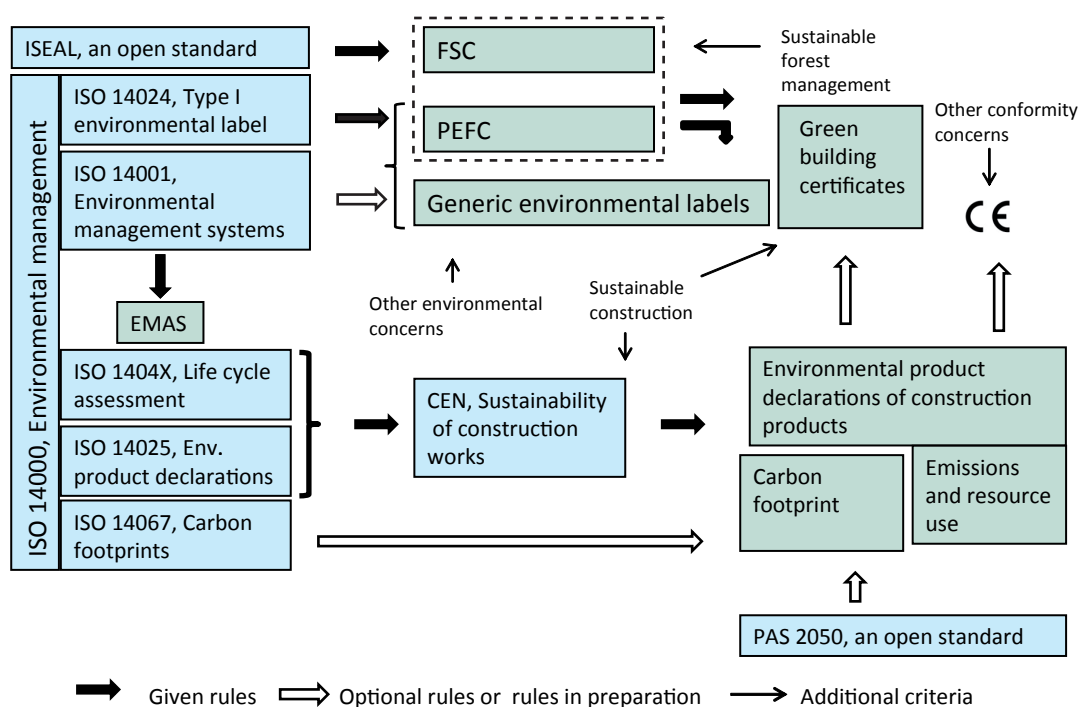


Figure 6. Environmental standards and labels in wood product industries

Both environmental labels and product declarations can be used for green building certificates. Usually at least one type of forest management certificate is acknowledged in a green building certificate, but not all the certificates account for quantifiable product-specific environmental information. This is at least partly due to the unsettled status of Environmental Product Declarations; their regional and material coverage varies. The recently published set of CEN standards will hopefully motivate producers in Europe to invest in declarations as the rules for life cycle evaluation are now more uniform. It would also be desirable for green building certification schemes to make more use of the work of the CEN.

The certification and labeling chains in Figure 6 have three critical points: generic environmental labels, green building and the CE mark. These are the tools and markets in which wood competes with other materials. Environmental labels are usually targeted to consumer markets, but a truly international, or even European, consumer label usable for wood products does not exist. Most of the volume of Nordic wood is used in construction. Thus, green building certification gives the most opportunities, and would allow the efficient comparison of materials. This is generally not yet the case. The tools for comparing materials are already available, however. For this, Environmental Product Declarations are needed. The third end point, the CE mark, is likely to be the tool to achieve this (page 29). If countries choose to annex environmental information to the CE mark, the incentives to issue Environmental Product Declarations will be increased drastically.

5.2 Efficient use of environmental performance measures

The discussion on environmental performance in wood product industries has been dominated by sustainable forest management certificates and their acceptability in markets. However, the sustainable origin of wood has not been a sufficiently strong tool in the market to grant price premiums on certified wood at the floor level. Also, most of the volume of timber is sold as part of other products, most importantly in buildings. The European Union timber regulation will demand accounts of responsible and sustainable sourcing of timber in 2013. Thus, even if the sustainability of forest management and the origin of wood are only part of the sustainability concerns in the construction business, proof will be required.

The use of environmental performance measures is efficient if grounded on, or resulting in, sustained competitive advantages at a firm or product level. Our review of the non-wood-related studies on environmental performance measures suggested that better environmental performance is usually associated with improved economic performance, but the evidence is generally weak. The studies usually accounted for the implementation of environmental management systems, product development or pollution prevention-related activities, but not the environmental properties of the raw material. In the case of wood products, the environmental performance and the desired competitive advantage arise from the substitution of wood for materials with fewer environmental credentials.

The natural resource-based view examines how different resources, tangible and intangible, are turned into strategic capabilities of the firm, acknowledging the role of the environment both as a resource base and as a stakeholder group. It accounts for several strategies, of which pollution prevention, or more generally, process measures, and product stewardship appear the most relevant to wood product industries. Process measures are based on the continuous improvement of processes, both operational and managerial. In Figure 6 the environmental management systems serve as an example. Product stewardship accounts for the stakeholder (including environment)

integration and pre-emption of competitors. Most of the environmental labels and green building certificates fall into this category. These strategies and associated environmental performance measures are necessary tools, but as noted above, they work more efficiently for sustained advantage if faced with substituting materials or designs.

A picture of environmental standards and certificates is not that simple, though. Managerial systems and eco-labels are tied together by a set of generic standards for the necessary steps for the sustainability of operations, rules to account for environmental impacts and reporting. Even for a small company good coverage of environmental certification requires a number audits and it is found to be costly. Therefore, companies should make the effort to find the appropriate set of certificates and eco-labels needed and streamline the audits as far as possible. Generally, ISO environmental or quality management systems are a good starting point, and are credited in audits for the eco-labels.

All our interviewed companies were active in environmental issues, but some were more reactive than proactive in their activities. We did not study their economic performance (and such research would call for a larger sample and the use of quantitative methods), but we posed several questions to identify whether the managers have a clear picture of how to attain economic gains. In almost all the cases the environmental performance was found to be an intermediary tool, but a necessary one not to lose market share, in export markets in particular.

The increasing concern for climate change and the scarcity of natural resources has motivated normative changes in markets. In the European Union, the work on standards for the sustainability of construction works has already reached its final steps. This is an opportunity for wood product companies to implement environmental information in the construction value chain. While forest certification is unique to forest products, generic eco-labels, such as green building certificates and Environmental Product Declarations, make it possible to compare the environmental performance of wood with that of other materials.

To integrate environmental issues into decision making, the main issue for the future is the integration of CEN Sustainability of Construction Works standards into the contemporary green building certificates. Currently there is no widely acknowledged EU-wide green building certification, but developers appear to choose the one available, or the one asked for. These certificates are far from unanimous in regard to both the criteria and the method of scoring. A more holistic approach is also called for to take better account of imputed environmental improvements, both locally and globally, in the building.

Even if the main environmental impacts of wood products are properly evaluated as part of green building certification, this is not possible if certification does not take place throughout the whole chain of custody. The cost of chain-of-custody certification can be reduced remarkably if Environmental Product Declarations are created jointly by the industry and the information cascaded throughout the value chain. Presumably this is one of the most important joint strategic actions to be taken by the wood industry. Given that competing materials do not improve their environmental profile remarkably, it may also work towards achieving sustained competitiveness of wood.

5.3 Influential hot spots

The interview results contained interesting information on the most influential customer groups and stakeholders, as well as on the products for which environmental communication has the greatest potential. In terms of important customer groups, it seems that other companies and public sector customers were the most environmentally aware. They tended to have set criteria, in particular in export markets such as the UK, where certified wood or ISO standards are required. Private consumers were not seen as being particularly environmentally aware, with the exception of consumer labels (mainly the Nordic Ecolabel) that are widely recognized and seen as a guarantee of environmentally friendly products.

Similar results were found in the sections that addressed communication and targeted stakeholder groups. Environmental communication was mainly directed at existing or potential customers, and in many cases these included other companies. The most important stakeholder groups were customers, suppliers and environmental authorities, which means that the focus is on professional contacts. Thus, it could be said that the role of business-to-business demand is the most influential when promoting environmental values in wood products. Hence, this is also a topic that has not been sufficiently explored.

It was interesting to note that many of the interviewed managers thought that wood is inherently environmentally friendly, and that this would be a sufficient base for environmental communication. If we explain this through the VRIN and resource-based view of the competitive advantage of firms, these companies would see wood as a unique material that gives them an advantage over other materials.

Currently, the use of certified wood and ISO 14001 conforming operations are seen as sufficient to differentiate a company as environmentally friendly. Having PEFC/FSC guarantees the sustainable origin of wood and ISO 14001 proves that the company's operations adhere to an environmental standard. However, in the future the competition will be more intense. When more and more companies become PEFC or FSC certified, or begin using ISO 14001, this competitive advantage will be lost and these environmental performance measures may gradually turn into a minimum requirement. A company that wants to stand out in terms of environmental friendliness has to achieve even more.

Even among our purposively selected sample there are examples of companies that have decided to use different strategies or have been successful in identifying segments in which wood would have a more sustained competitive advantage. To name some extreme cases, in one company the entire business idea is based on an environmentally friendlier alternative to an existing product, a merchant is participating in a project to develop energy-efficient lifestyles and a couple of companies are striving to improve the environmental friendliness of their operations without relying on any existing certificates. Companies that are losing their cost competitiveness might start addressing consumers more directly, develop other ways to be environmentally friendly or start discussions with the construction sector to give a challenge to competing materials.

5.4 Gaps in perceptions

The issue of possible gaps in the perceptions between suppliers and customers was raised as one of our research questions. The concern arose from multiple nodes in the value chain, where pure

environmental issues like the sustainable origin of wood are converted to expectations of business opportunities. Multiple stakeholders are involved; a company frequently acts as a buyer and a supplier, and owners, regulators and NGOs all set their own requirements. The use of environmental management systems is motivated by the search for operational and economic gains by looking at the environmental issues. In our experience, this is mostly a dead letter to the companies; environmental management systems are built into the business code and environmental impacts are not anticipated.

The view of the sustainability or environmental friendliness changes as wood competes with, and is mixed with, other materials for end-user products. This is true especially in the construction value chain. Constructors have to serve multiple-objective environmental claims, ranging from the energy efficiency of the building to the efficient use of the infrastructure. The environmental properties of materials enter into this decision with a low weight, but become an important issue if the claims can be met just by requiring certified materials. Wood products can contribute when their chain of custody is fully certified. This is the case where the views of the business companies appear separate. Value-added producers have not yet faced the demand for chain-of-custody certification. When green building certification becomes wider spread, they will probably have to be able to react quickly. Even if in this case instant profits cannot be expected, wood industries can finally obtain the chance to enter emerging markets for environmental performance.

6 Conclusions

This study was based on a detailed analysis of the existing literature and technical documentation on environmental performance. The scope was the wood product value chain, but it was studied also into the light of more general business literature. One of our contributions regarding environmental performance is the introduction of the concept of sustained competitiveness as the basic criterion evaluating the efficiency of environmental performance measures in the wood industry context. Analysing the impacts on the environment and economic efficiency were beyond our scope, but we consider that only measures that are also sustainable in the economic aspect will actually be used in the long run and by implication thus need to be environmentally efficient. Normative tools can be used to alter the economic effects of these measures.

The review of environmental measures and their characterization was combined with an interview study in 3 expert organizations and 37 companies in Finland, Sweden and Norway. The interest lay in the use and the perceived usability of different environmental performance measures. The motivation to use them was studied from the companies' own point of view, including their expectations of their customers' needs, use of communication media and integration of environmental issues into the general business strategy. We have drawn conclusions based on our analysis of the existing measures and the experiences of the interviewees.

Most of our results concern the use of sustainable forest management and CoC certificates. A sustainable origin of wood is important information that should be attached to wooden products throughout the value chain. Both competing forest certificates also have chain-of-custody certification schemes, but at the global level their usage is as yet very limited. In the interviews, the constructors raised the question of the poor availability of chain-of-custody certified products. They are important for both ends of the certification chain, the industrial and private customers. These are the hot spots where wood products meet competing materials and sustained advantages through environmental performance measures can be found.

Industrial users, mainly in construction, are preparing to use green building certificates. The field of green building is still somewhat unsettled, but the sustainable origin of the materials used, wood and non-wood, is a criterion when a building is evaluated and forest certification plays an important role. This can also work against the use of wood; in the LEED certificate just the FSC certificate is accepted, omitting the broadly available PEFC certified wood.

In consumer markets, the main consumer labels, the Nordic Ecolabel and EU Ecolabel, also have set criteria for the origin of materials. Chain-of-custody certification is usually required. It should be also acknowledged that an average consumer is not likely to be particularly aware of sustainability criteria in forestry, thus more familiar generic eco-labels attract more attention and can be used to compare wood and non-wood products. Generic eco-labels usually claim relatively better environmental performance than average, whereas sustainable forest management certificates have a shortcoming in that they do not make such claims relative to other products.

Environmental Product Declarations provide a firm background for making any environmental statements on the products. The current developments in standardization will shortly make available a format for pan-European Environmental Product Declarations for building products. This is an obvious opportunity for wood product industries to set an environmental challenge for non-wood materials. Whether the environmental properties of wood will be enough to yield economic

gains depends on several other developments, mostly in relation to green building certification and CE marks. Environmental Product Declarations will be compiled with certainty when environmental information is annexed to the CE mark. The breakthrough of wooden structures in buildings can be better expected if green building certificates take a more holistic approach to accounting for local environments and improvements in environmental issues at the project level.

This study was originally intended as a pilot to find new ideas and suggest new paths for the discussion on the environmental performance of wood. To gain firm-level sustained competitiveness through environmental performance, wood producers would have to be able to present an environmental challenge to non-wood products. This is partly a policy issue but a research agenda can also be developed. It is obvious that efforts and expenditure can be saved if public industrial policies are used to support joint actions for chain-of-custody certification. Also, the development of the CE mark could be an important policy issue. Research is obviously needed to develop alternatives to the current green building rating schemes to give environmental criteria more weight. When strict requirements for buildings' energy efficiency come into effect, it is the materials and the use of the building that will make the environmental difference between otherwise equal buildings.

This qualitative study has explored many topical issues regarding the use of environmental performance measures, related communication, perceived strategic importance and key areas of development, but leaves room for future research. From the communication perspective, our results suggest that the Nordic wood industry still need hands-on help to raise the role of environmental performance measures in its market communication. This applies both in the heavily relationship-based business-to-business industrial markets and in the long chains towards final consumer markets in order to raise end-users' environmental awareness and target green marketing towards the most environmentally sensitive segments.

In the future we can expect environmental issues to remain strongly on the wood industry research agendas due to the globally strong cry for sustainability. The related marketing and managerial research should therefore focus, on the one hand, on providing more quantitatively oriented information on how companies could efficiently segment their industrial and consumer markets and, on the other hand, on a more qualitative approach considering how different types of companies could plan and implement environmental communication more efficiently and effectively. In the end, what we would like to achieve is sound progress in the way stronger product and corporate brands could be developed based on corporate environmental and social sustainability to achieve higher brand loyalty and sustained profitability in this industry.

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Appendix 1 Interviewed companies

A summary of the interviewed companies. The column labels are:

Code = company ID

Products = main products

Export = approximate share of exports

Wood = approximate share of wood in the value or volume of the products

Size = turnover; see Table 2

Value chain = phases in the value chain

Pr = primary, VA = value-added, C = construction, W = wholesale, R = retail

Code	Products	Export	Wood	Size	Value Chain				
					Pr	VA	C	W	R
FIN01	Wooden outdoor equipment	15	90+%	Medium		X			
FIN02	Treated wood	8	90+%	Micro		X			
FIN03	Wooden outdoor equipment	70	25–49%	Medium		X			
FIN04	Treated wood								
FIN05	Wooden outdoor equipment	90	90+%	Micro		X			
FIN06	Sawing, planing, impregnating	85	90+%	Medium		X			
FIN07	Building materials	0	50–74%	Very large				X	X
FIN08	Building materials	70	90+%	Very large	X	X			
FIN09	Flooring	50	90+%	Small		X			
FIN10	Timber and building parts	55	75–89%	Large	X	X			
FIN11	Flooring	77	90+%	Large		X			
FIN12	Timber and building parts	42	90+%	Large	X				
FIN13	Private houses	20	90+%	Medium		X	X		
FIN14	Timber and building parts		90+%	Very large	X	X			
FIN15	Treated wood	65	90+%	Medium		X			
FIN16	Private houses	60	-25%	Large		X	X		
FIN17	Timber wholesale	0	90+%	Large				X	
NO1	Joinery and flooring	13	90+%	Medium		X			
NO2	Interior wood products, joinery and flooring,	0	90+%	Medium		X		X	
NO3	Interior wood products	0	90+%	Small		X			
NO4	Timber, interior wood products and treated wood	5	90+%	Large	X	X			
NO5	Timber and joinery	30	90+%	Medium	X	X			
NO6	Building materials	0	-25%	Very large				X	X
NO7	Joinery	5	90+%	Medium		X			
NO8	Construction	0	-25%	Very large			X		
NO9	Treated wood	25	50–74%	Small		X			











Table continues on the next page

Code	Products	Export	Wood	Size	Value Chain				
					Pr	VA	C	W	R
SWE1	Building materials	0	-25%	Medium				X	
SWE2	Furniture and interiors	0	50–74%	Small		X			
SWE3	Building materials	0	75–89%	Very large					X
SWE4	Timber	6,7	50–74%	Large	X				
SWE5	Timber and private houses	50	90+%	Large	X		X		
SWE6	Timber and joinery	50	90+%	Large	X	X	X		
SWE7	Construction and civil engineering	0	NA	Very large			X		
SWE8	Consumer construction	0	90+%	Very large					X
SWE9	Construction and civil engineering	0	-25%	Very large			X		
SWE10	Timber and joinery	75	90+%	Very large	X	X			
SWE11	Timber, joinery and construction	60	90+%	Very large	X	X			
SWE12	Furniture and interiors	80	50–74%	Very large		X			X

Appendix 2 Interview guide: companies

<p>Market communication of wood products Jarmo Rajala, ComWoodVal jarmo.rajala@metla.fi +358 40 801 5184</p> <p>METLA</p> <p>norden Nordic Forest Research Co-operation Committee (SNS)</p> <p>30.5.2011</p> <p>Interview Guide</p> <p>1. Background information</p> <ol style="list-style-type: none"> Respondent's professional role and years of experience in the company, areas of responsibility? What is company turnover, share of exports out of turnover, main export markets? (check out from website before interview) What is the share of wood out of company's total raw material use (or sales in case of retailing)? Is the origin of wood used in the company local/domestic/international? <p>2. Measures, standards, forest certificates, and eco-auditing</p> <ol style="list-style-type: none"> Please check in the attachment table, which environmental performance metrics (EPMs) is the interviewee familiar with and which are being used in the company (with year of adoption)? What content information in forest certification/eco-labels/environmental management systems/EPDs/LCAs is the most important? Within specific labels or certificates above, which are the most useful environmental indicators? Why? Do existing performance measures meet the needs of the company? If no, what kind of information is missing? Is eco-auditing being used in the company, why or why not? What are its benefits? What is (or would be) the main incentive for your company to use EMS (e.g. EMAS or ISO 14001 alone)? (competition, customer requirement, own strategy, other?) Does the company feel the above measures, standards, and auditing too expensive or can they bring extra benefits to the company some way? Have the company considered to produce EPDs for its products? Is there pressure from competitors (wood or non wood users)? Please give examples if this pressure differs between different countries or markets. Are any of the company's products raised to meet Green Building certificates? If so, what? If not, what problems are in Green Building certification? How do your customers perceive importance of forest certificates? If they are important, to which customer groups in particular? Does the company consider the above measures, standards, forest certificates and auditing separately? If so, do they cause extra costs and even conflicts or can they be integrated into one system in your company? (if so, how?) 	<p>3. Customers (or Suppliers)</p> <ol style="list-style-type: none"> Please list your company's three main customer groups for your company's wood products: <ul style="list-style-type: none"> - retailers - wholesalers - industrial end-users - public sector - private consumers - some other, please specify! In which way are the three main customer groups of your company environmentally aware? (please give examples) What kind of environmental documentation are your customers asking for? How have your customers been able to benefit through market access, higher market share, customer retention, price premiums etc.) from using environmentally friendly products/processes in their companies? How do you collect information about your customers' needs and wants? How do you co-operate with your customers e.g. in communication/market research/new product development? How do you co-operate with your suppliers e.g. in communication/market research/new product development? <p>4. Communication</p> <ol style="list-style-type: none"> What are the main target groups for your company's environmental communication? What environmental and general information related to the product or production process is communicated to buyers or retailers? What EPMs, environmental standards, eco-labels are used in communication (see also Table)? Which communication methods are used by the company generally: <ul style="list-style-type: none"> - advertising, websites, brochures - sustainability report - product presentations, professional fairs etc - PR-type communication - personal selling - social media (e.g. Facebook, Twitter) - public announcements Which communication methods are used by the company for environmental communications: <ul style="list-style-type: none"> - advertising, websites, brochures - sustainability report - product presentations, professional fairs etc - PR-type communication - personal selling - social media (e.g. Facebook, Twitter) - public announcements Which communication methods are used by the company in comparing and reviewing suppliers <ul style="list-style-type: none"> - advertising, websites, brochures - sustainability report - product presentations, professional fairs etc - PR-type communication - personal selling - social media (e.g. Facebook, Twitter) - public announcements In which products are there best opportunities to use environmental information in marketing in the future?
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- 5. Strategic role of environmental issues in company**
- If your company has an environmental policy statement, can you explain the key elements of it? Could you explain what are the goals and priority areas of it? How is the policy followed up?
 - Do all the members of your company including top management, employees, and sub-contractors know your environmental policies? How do they apply it into their work practices, for example by code of conduct or other assessment?
 - How does your company examine environmental impacts when designing new products or implementing services to new or existing products, or in developing production processes?
 - Does your company have an interest in redirecting consumers' needs and wants towards...
 - less material consumption/energy consumption/CO₂ emissions?
 - less environmentally harmful consumption?
 - any other aspect?
 - Which groups are considered to be the most important stakeholders for your company in terms of environmental issues?
 - Does your company invite input from environmental NGOs when making environmental business decisions? If yes, which NGOs does the company interact with?

Environmental Performance measure	Knows	In use	Environmental Performance measure	Knows	In use
					
					
					
			Environmental management systems: ISO 14001		
			EMAS		
			Green building LEED BREEAM DGNB		
			Environmental product declarations Footprints LCA tools		

Appendix 3 Interview guide: PEFC

Market communication of wood products
environmental values, ComWoodVal
Tarmo.Raty@metla.fi
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24.10.2011

Interview Guide

SNS interview PEFC

1. Respondents' professional role and years of experience in the company, areas of responsibility?
2. How many PEFC certified companies currently exist in Finland/Norway?
3. To which customer groups are forest certificates important?
4. What are the main similarities/differences between competing forest certification systems?
5. Are there any conflicts between forest certification systems or other existing environmental performance measures?
6. In which products are there best opportunities to use forest certificates in marketing in the future?
7. It has turned out that a number of companies have found it hard to turn SFM-certification to better business. In your view, how have the companies been able to benefit from using certified products /processes??
8. Have you done changes with procedures to grant the right to use PEFC logo, or set of requirements for the company or product, in order to promote usage of PEFC logo (and therefore to promote SFM).
9. Which products are labeled with PEFC logo at the moment? (Examples of different products)
10. Are you co-operating with:
 - a. Green building certification systems to introduce PEFC as a valid criterion?
 - b. A condition for EU ecolabel or national variant of it?
 - c. ISO14001/EMAS?
11. Which communication methods are in use in PEFC?