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**COMPETENCE AND IMAGE OF WOOD
ON THE GERMAN BUILDING
MATERIAL MARKETS**

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ABSTRACT: This survey study focuses on wood-related opinions of German companies selling wood products. The image of wood is described, as well as critical product characteristics when companies purchase wood products. The data comprises interviews of 75 companies or business units selling wood products. These companies represent 75 % of the value of the total German construction material trade. Overall, the results indicate that visual properties, usability (like lightness and workability) and environmental quality are the main strengths of wood. Especially important these are in marketing of wood products for inner decoration and for furniture manufacturing. Certain technical properties (like strength) and market properties are the main relative weaknesses of wood; price and quality of wood products are perceived as only moderately stable. The results also indicate that the Finnish wood product suppliers could increase their activity in marketing (domestic suppliers are perceived more active than foreign ones). Marketing and product development could be based on the particular strengths of wood. Particularly, the human health dimension deserves more emphasis in marketing and in research. End-users could be taken into consideration even more strongly when developing marketing communication. Developing product information and marketing material targeted at end-consumers, and providing this material for the use of the retailer companies could be helpful. For example, the German construction material companies stressed the need for image campaigns to promote the use of wood among end-consumers. This could be an opportunity for co-operation between suppliers of primary products and retailers.

Key words: *Construction material markets, quality, wood products, marketing, Germany.*

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TIIVISTELMÄ: Tässä survey-tutkimuksessa kuvataan puutuotteisiin liittyviä mielipiteitä sekä puun imagoa puutuotteita myyvien saksalaisyritysten keskuudessa. Lisäksi tarkastellaan näille yrityksille tärkeitä tuoteominaisuuksia, joiden perusteella puutuotteet valitaan tuotevalikoimaan. Tutkimuksen aineiston muodostaa 75 saksalaista, puutuotteita myyvää yritystä / liiketoimintayksikköä. Yritysten yhteenlaskettu liikevaihto kattaa noin 75 % Saksan vuotuisesta rakennustarvikekaupasta. Tulosten mukaan puun ulkonäkö, käyttöominaisuudet (kuten keveys ja työstettävyyttä) ja ympäristöystävällisyys ovat puun vahvuuksia. Nämä ominaisuudet ovat erityisen tärkeitä markkinoitaessa sisustuspuutuotteita ja puutuotteita huonekaluteollisuudelle. Eräät tekniset ominaisuudet (kuten lujuus) ovat puun suhteellisia heikkouksia. Suomalaisten puutuotevalmistajien kannalta markkinoinnin tehostaminen saattaisi olla hyödyllistä, sillä haastateltujen yritysten mielestä saksalaistoimittajat ovat markkinoinnissaan ulkomaisia toimittajia aktiivisempia. Markkinoinnin kehittämisessä voitaisiin hyödyntää puun erityisiä vahvuuksia, eli miellyttävää ulkonäköä, hyvää yleistä imagoa, tyylikkyyttä, puun positiivisia käyttöominaisuuksia ja ekologisuutta. Yritykset näkivät ympäristöystävällisyyden tärkeimpänä piirteenä sen, että tuote on terveydelle turvallinen, joten puun terveysominaisuuksiin tulisi kiinnittää enemmän huomiota tutkimuksessa ja markkinoinnissa. Sahojen ja levytuotteiden valmistajien tulisi huomioida myös lopulliset kuluttajat kehittäessään markkinointiviestintäänsä, sillä loppukäyttäjille tarkoitettu, puutuotteita myyvien yritysten kautta tarjottua tuoteinformaatiota pitäisi haastateltavien mukaan lisätä puutuotteiden menekin kasvattamiseksi. Yritykset korostivat puun imagoa nostavien, kuluttajille suunnattujen kampanjoiden tärkeyttä puun käytön edistämiseksi. Rakennusmateriaalikauppiaiden ja esimerkiksi suomalaisten puutuotteita valmistavien yritysten välinen yhteistyö voisi olla hyödyllistä kampanjoiden toteuttamisessa.

Avainsanat: *Rakennustarvikemarkkinat, laatu, puutuotteet, markkinointi, Saksa.*

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YHTEENVETO

TUTKIMUS SELVITTI PUUN VAHVUUKSIA SAKSAN MARKKINOILLA

Hankkeessa selvitettiin puutuotteiden kilpailuasemaa muihin rakennusmateriaaleihin verrattuna ja arvioitiin, miten puutuotteiden menekkiä Saksan (osin Itävallan) markkinoilla voitaisiin lisätä. Erityistä huomiota on kiinnitetty puun ekokilpailukykyyn. Tavoitteena on myös ollut kartoittaa asiakkaiden, ennen kaikkea rakennustarvikkeita myyvien yritysten, informaatiotarvetta puutuotteista. Tämä tieto on tarkoitettu palvelemaan puutuotteita valmistavien yritysten markkinoinnin kehittämistä. Puutuotteiden kysyntänäkymiä Saksassa selvitetään erillisessä raportissa (Järvinen et al. 2001).

Aineisto kerättiin kesällä / syksyllä 2000 ja alkuvuonna 2001 yhteensä 75:ltä rakennustarvike-, puutavara- ja Tee-Se-Itse (TSI)- liikkeiden edustajalta. Pääosa aineistosta on hankittu haastatteluin (48), loput postikyselyllä (27). Aineiston muodostavien yritysten liikevaihto kattaa noin 75 %:ia Saksan vuotuisesta noin 220 miljardin markan (37 miljardia euroa Saksassa ja 1,6 miljardia euroa Itävallassa)¹ rakennustarvikekaupasta.

PUUTUOTTEILLA ON MONIA VAHVUUKSIA

Tulosten perusteella rakennustarviketuotteita voidaan yleisellä tasolla kuvata kahden dimension avulla. Näitä ovat tuotteen fyysiset ominaisuudet ja toisena toimittajayritykseen liittyvät tekijät, tuoteinformaatio sekä palvelu. Tekninen laatu, ulkonäkö ja ympäristöystävällisyys liittyvät fyysisiin ominaisuuksiin. Myös hinta liittyy yritysten mielestä ensisijaisesti fyysiseen tuotteeseen.

Kaikkiaan sekä fyysisen tuotteen kokonaisuudella että palveluilla ja toimittajayrityksen ominaisuuksilla on merkitystä yritysten tuotevalinnoissa. Yritykset asettivat kuitenkin tuotteen tärkeimmäksi ominaisuudeksi teknisen laadun. Myös toimittajayrityksen luotettavuudella on suuri merkitys. Aivan erityisen tärkeää tämä on TSI-yrityksille. Puun arvioitiin olevan kaikki tuotekomponentit huomioon ottaen kilpailukykyisin rakennusmateriaali. Kuitenkin tekniseen laatuun, eli kaikkein tärkeimpään yksittäiseen tuoteominaisuuteen, liittyvät puutuotteiden suurimmat suhteelliset heikkoudet verrattuna muihin materiaaleihin. Puun laadun katsottiin vaihtelevan muita materiaaleja enemmän. Puu koetaan edelleen myös syttymisherkeemmäksi kuin teräs tai betoni.

Yritysten hankkiessa puutuotteita omaan valikoimaansa ovat teknisen laadun lisäksi lähes yhtä tärkeitä tai joissain tapauksissa tärkeämpiäkin tuoteominaisuuksia hinta ja

¹ 1 EUR=5.94573 mk

puutuotteen ulkonäkö. Verrattuna muihin rakennusmateriaaleihin, ulkonäkö on selvästi puun merkittävä vahvuustekijä. Haastatellut saksalaisyritysten sisäänostajat pitävät puuta yksilöllisenä, lämpimänä ja ulkonäöltään kauniina ja tyylikkäänä materiaalina, jonka imago on korkeatasoinen. Puuta pidetään myös sosiaalisesti hyväksyttävänä materiaalina. Näiltä ominaisuuksiltaan puu on ylivoimainen verrattuna muihin rakennusmateriaaleihin: muoviin, betoniin ja teräkseen.

Lisäksi yrityksissä oltiin yhtä mieltä siitä, että puu voittaa ympäristöystävällisyydessä muut rakennusmateriaalit selvästi, joten myös ympäristöystävällisyys on puun selkeä vahvuustekijä. Tulokset vahvistavat kuitenkin myös sen, että vaikka ympäristöön liittyvät tuotepiirteet ovat tärkeitä, ne eivät ole tärkeimpiä valintatekijöitä tuotteita ostettaessa.

Yritysten mielestä ympäristöystävällisyyteen liitettävistä tuotepiirteistä tärkein on se, että tuote on terveyden kannalta turvallinen. Sitä, että puu on peräisin kestävästi hoidetuista metsästä, pidetään myös tärkeänä. Kierrätettävyyden ja pieni ympäristökuormitus ovat tärkeitä, mutta eivät aivan yhtä tärkeitä tekijöitä. Yrityksissä arvioitiin noin kolmanneksen asiakkaiden huomiovien ympäristöasioiden, mutta vain harvojen olevan valmis maksamaan tästä hintalisää. Yritysten mielestä tehokkaimmin ympäristöasioista kerrotaan kuluttajille ekomerkin tai ympäristötietoa sisältävän tuoteselosteen muodossa. FSC-metsäsertifiointijärjestelmä oli vastaajille hieman tunnetumpi kuin PEFC-metsäsertifikaatti.

PUUTUOTTEIDEN MARKKINOINNIN KEHITTÄMINEN

Kaikkiaan tämän tutkimuksen valossa näyttää siltä, että joillekin puutuotteille, mutta ei kaikille, voisi olla mahdollista rakentaa vahvasti ympäristöön perustuva ”eko-brandi”. ”Ekobrändi-tuotteita” voisivat olla huonekalut, muut sisustustuotteet ja ehkä myös puutalot. Brandin sisältö olisi syytä laajentaa kattamaan puun terveysvaikutukset perinteisen metsien kestävyys-ympäristökuormitus - tekijöiden lisäksi. Tämä puolestaan vaatii ensin satsausta puun terveysvaikutusten selvittämiseen.

Puutuotteille voisi kuitenkin olla kehitettävissä laajempi brandi, joka perustuisi ympäristöystävällisyyden lisäksi puun muihinkin vahvuustekijöihin; ulkonäköön ja siihen, että puu koetaan sosiaalisesti hyväksyttäväksi materiaaliksi. Tällaisen brandin avulla voitaisiin vedota laajempaan kuluttajajoukkoon, ja se ehkä antaisi myös enemmän mahdollisuuksia hintalisään.

Puun ympäristöön, sosiaaliseen hyväksyttävyyteen sekä ulkonäköön liittyvien ominaisuuksien voidaan katsoa liittyvän tietynlaiseen elämäntyyliin. Elämäntyyli muodostuu tietynlaisten arvojen, mielipiteiden ja siten kiinnostuksen sekä käyttäytymisen yhteis-

vaikutuksena. Tutkimuksissa on todettu, että kuluttajat haluavat toisaalta yksilöinä erottua muista, mutta samanaikaisesti halutaan kuulua johonkin ryhmään. Yhteisten arvojen jakaminen tuo turvallisuutta. Puun kauneus ja terveysominaisuudet ovat ominaisuuksia, jotka palvelevat kuluttajien yksilöllisyyteen liittyviä tarpeita, puun ympäristöllinen ja sosiaalinen hyväksyttävyyys taas edustavat tietyn kuluttajajoukon yhteisiä arvoja. Näiden kaikkien puun ominaisuuksien varaan rakentuvaa laajempaa brandia voisikin pitää eräänlaisena ”life-style” brandina. Jos tämä pitäisi nimetä, niin elämäntyylin edustajia voisi kutsua vaikkapa ”vihreiksi esteetikoiksi” tai ”tyylitietoisiksi vihreiksi”.

Tätä tietynlaista elämäntyyliä olisi mahdollista – ja pitäisikin – hyödyntää puutuotteiden markkinointiviestinnässä nykyistä selvästi enemmän. Koska puutuotteiden vahvuudet liittyvät kuluttajille tärkeisiin, ei-tekniisiin ominaisuuksiin, tulisi jatkossa tutkia erityisesti kuluttajien mielipiteitä. Tämän tiedon avulla voidaan parhaiten kehittää puutuotteiden imagoa ja kuluttajille suunnattavaa informaatiota.

Tämä tutkimus on toteutettu Wood Wisdom- ohjelman puitteissa ja se on osa Metlan laajempaa hanketta ”Puurakentamisen visiot Euroopassa ja puun kilpailuetujen hyödyntäminen”. Pellervon taloudellinen tutkimuslaitos ja Metla toteuttivat tutkimuksen yhteisesti ja hanketta rahoitti maa- ja metsätalousministeriö.

1. INTRODUCTION

1.1. BACKGROUND

Sawn wood and other wood products are mainly used in the construction sector. Use of wood has increased quite dramatically in Finland during the last few years. However, Finland still exports about 70% of the sawn wood production. The UK and Germany are the most important single market areas, both consuming over a million cubic metres of Finnish sawn wood annually. Hence, the competitiveness of Finnish wood products in the West European construction material markets is, together with the domestic markets, the most important factor influencing the future of the Finnish wood industry.

Competition on these markets will remain tight due to the proliferation of several competing wood-based materials, strongly rivalling other materials, and low growth in demand for the mechanical wood industry's main products. In Europe, production of sawn wood is 80 million m³, which is approximately equal to the annual consumption. Eastwards enlargement of the European union is expected to increase competition, as well as the recovery of Russian sawn wood production. Thus, an important means for Finnish wood industry to enlarge and even keep its markets is to improve attractiveness of its products on export markets.

During 1990s, it seems that the competitive strategy of the large Finnish sawmill companies has been based on scale and mass production through concentrating on one or few wood species and building new production capacity. All sawmills, but particularly SMEs (small and medium sized sawmills) would benefit from markets that fluctuate less than the traditionally strongly fluctuating commodity lumber markets. Competition based on commodity products may also be difficult for the SMEs. For both reasons, the general strategy that is suggested for the Finnish SMEs in the mechanical wood industry sector is to increase the degree of processing. The Finnish government, due to its positive employment effects, favours expansion of the woodworking industry. In practice, this expansion requires markedly expanding the export markets.

1.2. WOOD PRODUCT MARKETS

EUROPEAN MARKETS

Primary wood products fall into two broad categories, sawn wood goods, which also includes planed and impregnated goods, and wood-based panels. Wood-based panels include a number of different products made totally or partly from wood. The most im-

portant wood-based panels are plywood, particleboard, OSB (oriented strand board) and fibreboard like MDF (medium density fibreboard). Sawn wood and panels are materials that can be used as such, for instance sawn wood and plywood for concrete shuttering, or as a material input to value added manufacturing, for instance in carpentry and joinery, and furniture industrial branches.

Construction, in particular the gross fixed capital formation in dwellings, has the most direct influence on consumption of sawn wood and wood-based panels. In Finland, for instance, 90% of sawn wood is consumed in the building and construction markets, including new building, renovation, joinery and civil engineering (Juslin & Neuvonen 1997). The emphasis on new construction sometimes overshadows the demand for wood products for the repair and renovation markets. The value of wood products for renovation and improvement is often equivalent to that of new construction, however (ECE/FAO Forest Products Annual...2000).

It is often implicitly assumed that “more housing means more consumption of sawn timber and panels”. This can be true in short term, but in the long term, it is conditional on maintaining competitiveness against competing materials. The latter sectors in many cases have the advantage of larger enterprise size. For this reason, competing materials (such as plastics or in some cases concrete or steel) may be better faced for efforts of promotion and marketing than the sawn wood and panels sector. Many SMEs find it difficult to co-operate in marketing and promotion, and are much slower to respond to changes in the markets. (See Burrows & Sanness 1998)

In Europe, Sweden and Germany have the greatest production of sawn wood, followed by Finland and Austria. More significant than the production, however, are the figures for each country’s self-sufficiency in sawn wood. Only Sweden, Finland, and Austria are self-sufficient, and are thus the largest exporters. Sweden exports most of its sawn wood, followed by Finland, Austria, and Germany (see, for instance, the Finnish Forest Research Institute 2000). In 1999, Germany became the largest sawn wood producer in Europe, and continues to be the greatest consumer by far. Hence, Germany is a major trader in sawn wood with a large domestic production (14.8 million m³ in 1999), and large imports (5.3 million m³ in 1999) and exports (2.0 million m³ in 1999). (ECE/FAO Forest Products Annual... 2000. See Appendix 1)

Particleboard covered over 67% of the total consumption of wood-based panels in Europe in 1999 (ECE/FAO Forest Products Annual...2000). Countries have specialised in the production of different types of wood-based panels - for instance, Finland specialises in plywood and is a major exporter of plywood in the European Union. Germany is the biggest exporter of MDF. The production of wood-based panels is widely distributed across Europe, with some non-traditional forest industry countries being

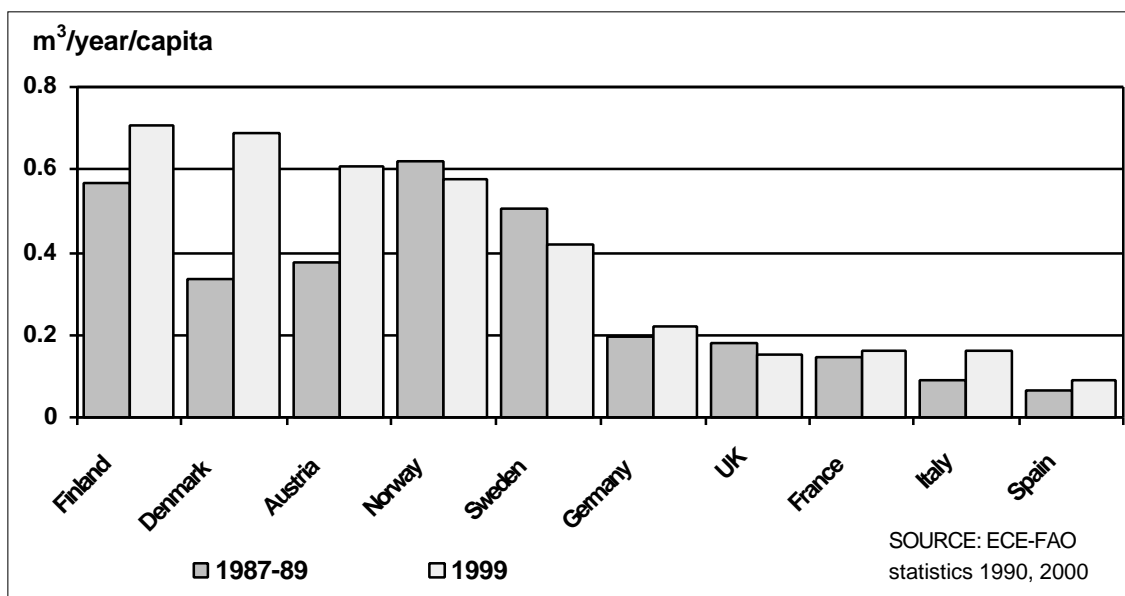
amongst the largest producers (Belgium and Italy), although Germany is by far the largest producer, accounting for one-third of particleboard production in Europe. However, Germany is a net-importer of all major wood-based panel products. (Hazley 2000)

In line with the overall growth of economies, particularly the construction sector, the apparent consumption of wood products in Europe rose in 1999². Consumption of sawn softwood moved up to a record level of 86.8 million m³. Panel consumption rose to 52 million m³ (ECE/FAO Forest Products Annual...2000).

The apparent consumption of sawn wood and of wood-based panels in Europe is clearly the highest in Germany and the U-K. The situation changes considerably when reduced to a standard measure of apparent consumption per inhabitant: Finland, Denmark, and Austria are the largest per capita consumers of sawn wood (see Figure 1)³.

Europe consists of a variety of cultures, languages, traditions, and economies. Consequently, residential building techniques and traditions in using wood vary from region to region. Therefore, changes in wood consumption take place slowly. In spite of this, many of the European countries have shown a slight curve-shaped increase in sawn wood consumption. The increase has been particularly obvious in Denmark and Finland. According to ECE/FAO, consumption of wood-based panels has also especially increased in Ireland, Italy, Germany, and Denmark during recent years.

Figure 1. Apparent consumption of sawn timber per capita.



² Europe includes the EU-15 countries and Bulgaria, Croatia, Cyprus, the Czech Republic, Estonia, Hungary, Israel, Latvia, Lithuania, Norway, Poland, Romania, Slovakia, Slovenia, Switzerland, The F.Y.R. of Macedonia and Turkey.

³ After the adjustment of statistics, Finland's annual consumption of sawn timber rises to 1 m³/year/capita.

The Finnish saw milling industry has increased its production by 80% during the last ten years (from 7.4 million m³ in 1990 to 13.3 million m³ in 2000). In the same period, the export volume has doubled (from 4 million m³ to 8.3 million m³). The United Kingdom (1.4 million m³) and Germany (1.1 million m³) are the biggest export markets accounting for 30% of the export in 1999. (Finnish Forest Research Institute 2000)

In the Finnish forest industry, there is a trend towards an increasing size of production units and a reduction in the number of manufacturing companies through mergers. The number of mills producing more than 10 000 m³ per year has increased from 110 to 170 during the 1990s, with mills producing over 60 000 m³/year accounting for almost 90% of the total production. (Petäjistö et al. 2000)

Finland also plays an important role as a producer and exporter of wood-based panels. Finland leads Europe in plywood production, producing about 1 million m³ in 1999 and exporting as much as 940 000 m³. However, the production of particleboard and fibreboard is of less importance: Finland produced 439 000 m³ – and 96 000 tons, respectively, and about half of these quantities was exported. For Finnish wood-based panels, the UK and Germany are the biggest single export areas. (Finnish Forest Research Institute 2000)

The European distribution segments, DIY chains (do-it-yourself companies, also known as home centres) and building material chain companies, are rather concentrated. However, the degree of concentration of the sector varies according to the country: the DIY segment is perhaps least concentrated in Germany, where the top ten companies have around 40% of the market. In the German market, the top 33 building material chains have about 25% of the market for building materials. Wood product wholesalers are the dominant distributors of sawn timber. In the future, building material merchants are likely to actively move into the DIY market. In addition, some of the DIY companies will probably become increasingly pan-European with stores in a number of eastern and western European countries. (Timwood AB... 1998)

TRENDS IN WOOD PRODUCTS MARKETS

Among others, the FAO forecasts that a number of structural changes will occur on the forest products markets: markets will become continuously more global and wood materials will be shipped considerable distances between continents. The results could be a proliferation of sales offices in export countries, or foreign production investments in timber-rich regions. However, with this increasing competition on the commodity markets, stronger market orientation also becomes necessary for the primary forest industry. They need to diversify products and develop the ability to better meet customer requirements.

Part of the market orientation is producing new products to meet specifications that are more exigent or to improve the current uses of wood. An example is the substitution of wood I-beams for solid-wood joists and rafters. The combination of solid wood and composite products in engineered wood products enables new functions, as well as improvement to existing applications. (ECE/FAO Forest Products Annual... 2000)

In general, the production of value-added wood products has increased during recent years. Development has, however, been rather slow, and it is estimated that the mechanical wood industries have difficulties in significantly increasing the share of value added production. In the short term, only a rather evolutionary further development of techniques and products is expected. (Timwood AB ...1998)

A significant trend on the forest products markets is the increased communication between the forest sector and the public. Environmentalism has been designated as potentially "the biggest issue of the 1990s". Although it is not sure how environmental concerns and the non-governmental pressure on the forest industry will develop in future, environmental issues cannot be ignored. Environmental consumerism sets challenges for companies but may also create opportunities for manufacturers able to demonstrate a strong environmental performance. (Kärnä et al. 2000)

On the level of values and attitudes, consumers are sympathetic towards the environment. However, sharp differences exist between countries and even product categories concerning people's awareness of the environment. Perhaps the most environmentally aware customers in Europe are the Germans (Valtonen et al. 1997), but even they pay less frequent attention to the environmental friendliness of wood products compared with paper products.

Besides structural changes in markets increasing competition, the supply/demand situation is expected to change. Timber production in the world is forecasted to increase from 425 million m³ in 1997 to 480 million m³ by 2010. In addition, the FAO has forecasted that the global demand for timber will be 474 million m³ by the year 2010, which means there will be an ample supply of mainly softwood timber in regions like North America, South America, Oceania, and Europe. America and Oceania are expected to increase their production of sawn wood from plantation forests. In the same time the saw milling industry in countries like Germany, Austria, the Nordic Countries, some East European countries, European Russia and the Baltic States also have forest resources to increase sawn wood production. Only Asia and Africa are forecasted to be net importing regions (ECE/FAO European Timber Trends...1996). Overall, this outlook suggests a strong common interest for the European wood products industry to improve the consumption of wood products on the European market.

1.3. PURPOSE OF THE STUDY

The purpose of this survey-study is to describe the image of wood, and to analyse its competencies in relation to other construction materials in Germany. Particular emphasis is on the ecological image of wood. The study follows a market/customer-oriented perspective and thus focuses on German retailer and wholesaler companies trading wood products and other construction materials.

The study aims to address the following specific questions:

- Which characteristics of building materials are important to German intermediate customers when they make buying decisions; in general and particularly in the case of wood products?
- What are the general image, and specifically the eco-image of wood in comparison with other materials?
- How are the ecological product characteristics communicated most efficiently to German end-users?
- How do Finnish wood product suppliers perform in comparison with wood product suppliers in competitor countries regarding marketing communication?

It should be noted that end-consumers are described only on the basis of the respondent companies' evaluation of their own customers. The information contained in this study is aimed to support the development of wood products and their marketing, particularly on the German markets.

1.4. THEORETICAL BACKGROUND OF THE STUDY

1.4.1. *Market orientation and competence*

MARKET ORIENTATION

Market orientation - or being market driven - is a philosophy behind company strategy and operation. Market driven companies are customer oriented, i.e., they put emphasis on producing value for customers, and thus follow the customers' point of view when developing their own operation. Market orientation also includes continuous anticipation of the needs of customers by an organisation and the development of steps to create a bundle of benefits to meet these needs (Kohli & Jaworski 1990). However, a market driven company does not focus merely on the customers but also continuously analyses its competitors and assesses its competitive situation on markets (for instance Day 1990).

Market orientation assumes that competitive advantage can be created from the company's ability to produce superior benefit for its customers. This aim should guide product planning (Desphande et al. 1993)⁴. Market orientation can also be connected with marketing strategies focusing specialisation in customer segments and products⁵.

PRODUCT AND PRODUCT QUALITY

A product concept is helpful when systematically analysing products in order to find ways of improving product quality or otherwise differentiating them. In several definitions, a product is described as composed of various components that may be hierarchical (for instance Levitt 1980, Kotler 1997).

Several product concept definitions divide a product at least into tangible and intangible - or physical and service - components (Levitt 1980, Shostack 1977)⁶. A market / customer-oriented definition emphasises the customer viewpoint: a product is a bundle of benefits satisfying customer needs and helping them to solve their problems. Levitt (1980) defined the product as follows (examples by Kalafatis et al. 1996⁷):

1. Core product (the basic product, building material, such as sawn wood)
2. Generic product (softwood lumber)
3. Expected product (minimum purchase condition, lumber of certain dimensions and species, packaged and delivered as agreed)
4. Augmented product (Attributes that differentiate the product; may include special extra services, product characteristics increasing customer satisfaction. It is necessary that the customer is informed about the factors which augment the product.)
5. Potential product (everything potential that can be done to develop the product).

⁴ Narver & Slater (1990) showed a positive connection between market orientation and economic performance within the U.S. forest industry. Bush & Hansen (1996) showed that lumber buyers are willing to pay extra for product and service characteristics that they emphasize.

⁵ For instance, Juslin (1995) has categorized different marketing strategies based on the degree of specialization in product/customer choices, related market areas and sources of competence. This typology has linkages with Porter's (1980,1985) generic strategies based on cost-leadership and differentiation.

⁶ Thus, it is not only the actual (physical) product but also many other things that relate to the product and vendor company, which jointly provide the satisfaction for customers (Kalafatis et al. 1996).

⁷ Usually the core and generic levels refer to a commodity type of product. The expected and augmented levels include possibilities to differentiate products according to the target customers' needs.

The product definitions based on hierarchical levels and components do not exclude but complement each other. Forest products are not an exception⁸. Customers perceive wood products as including both physical and intangible dimensions.

Competitive advantages are often connected with product quality, especially in market-oriented companies. Improvements in quality can lead to improved competitive advantage even in mature industries such as lumber industry (Bush & Hansen 1996).

Thus, product management should aim to develop product quality that leads to lasting customer relationships. Quality development should reach all components and parts of the product, especially those that are of particular importance to the target customer groups. However, quality is relative to customer needs, perceptions, and even defined by the customer. Quality is also defined with respect to various product components and the dimensions of these components. Especially organisational (company) types of customers are claimed to assess quality based on all product dimensions (see Kalafatis et al. 1996).

In practice, gaps may exist between what the wood industry and its customers regard as critical product characteristics and how the buyers and manufacturers estimate the products to perform. Bush & Hansen (1996) and Weinwurfer & Hansen (1999) have shown that U.S. lumber producers tend to concentrate on the physical product while the buyers evaluate lumber products as a whole package of benefits, consisting of the physical product, services, producer characteristics and so on. Therefore, the product and its quality should be evaluated externally - from the customers' perspective - when seeking to develop increased quality and other value-added for the customers.

1.4.2. Earlier studies on wood products and their characteristics

A number of previous research projects have focused products and/or their quality in the wood industry. For example, Toivonen & Ahola (1996) introduced a component model for forest products (sawn wood, paper and paperboard) and performed some preliminary testing of the model with empirical data in Finland. The model comprised physical, service, information, and environmental components. The results suggested that the physical product dominated the total product within all sectors in the forest industry, but it was the most dominant within the sawmill industry. Environmental characteristics had the least contribution to the total product within the sawn wood industry. A shortcoming of the study was that the empirical data did not focus on customers of the forest industry but persons working within the sawmill industry and thus provided an internal rather than external view on products and their development.

⁸ See Weinwurfer & Hansen (1999).

Cooper et al. (1996) analysed end-consumers perceptions of wooden furniture. They concluded that information is an integral part of their products (wooden furniture). They operationalised environmental information related to the product by referring to the eco-label.

Toivonen & Laurila (1997) attempted to theoretically analyse round wood and wood product dimensions from an industrial customer's perspective. The analysis focused on the problem of marketing lesser-used tree species, and concluded that mechanical (such as durability and strength), biological, aesthetic (such as colour and figures) and ecological factors are of importance when buying decisions are made for wood and wood products. Information on these product dimensions was seen a necessary part of the final marketable product. Several indicators of each of the product dimensions were named.

Bush & Hansen (1996) formulated a four-dimensional quality description of lumber based on empirical data:

1. Performance (strength, durability, long service life of lumber, few failures in service),
2. Lumber characteristics (appearance, cleanness of packing and the lumber itself, straightness, accuracy and consistency of grading),
3. Supplier/salesperson characteristics (understanding customer needs, ease of understanding supplier) and
4. Services (credit terms, flexibility regarding packing methods and lot sized, variety of species).

Lumber buyers ranked supplier characteristics and lumber characteristics as most important. Weinwurfer & Hansen (1999) confirmed this result. Bush & Hansen (1996) showed that lumber buyers ranked "overall lumber appearance" and "lumber straightness" as more important product characteristics than the producers had assumed. Overall, accuracy and consistency of grading, overall lumber appearance, supplier understanding of buyers' needs, neat and undamaged lumber packaging and lumber straightness were the most important characteristics for lumber buyers. This conclusion is in accordance with the idea of visual characteristics being an important dimension of wood products.

Niemelä (1996) analysed competencies of Finnish sawmills and compared their performance with that of Swedish sawmills. He described sawn wood and related services using four dimensions: raw material and production, physical product, customer relationships and deliveries. The main differences in the measurement of these dimensions compared with Bush & Hansen (1996) was that the physical product was an aggregated concept. By contrast, services were measured in a more fragmented way. Niemelä

(1996) also measured environmental soundness of round wood, inventiveness, and electronic communication facilities (EDI) of sawmills. The results suggested that the aggregate quality of the physical lumber was a competence of both Finnish and Swedish sawmills together with reliability of deliveries, and environmental soundness. However, customers perceived that the performance of Finnish sawmills was poor regarding electronic data interchange connections, inventiveness and taking into consideration customers' needs.

Niemelä's study suggests that Finnish sawmills are not very market-oriented from their customers' perspective. The results also indicate that Finnish and Swedish sawn wood is so similar that it is difficult to create competencies based on the physical core product. Thus, developing the intangible product characteristics and services are the key to creating competencies. Overall, several authors argue that the more tangible the product is the more the intangible characteristics should be emphasised in marketing and vice versa (Sinclair 1992, Shostack 1977, Levitt 1984 and Kühn & Becker 1999).

1.4.3. Earlier studies on image and competencies of construction materials

The image and competencies of construction materials have been analysed in a few studies. For instance, Cohen & Kozak (1996) assessed the perceptions of architects and structural engineers of wood (and steel, concrete and masonry) as a structural material in commercial construction in North America. Their results indicate that environmental issues are important in the specification of structural materials. Wood products were considered to be the most "environmentally friendly" material. Concrete and masonry scored somewhat better than steel, but not as highly as wood products, and steel scored the lowest of the four materials.

Somewhat later, Burrows & Sanness (1998) compared various construction materials and concluded that cost is the essential factor for substitution of forest products. As wood and wood fibre increase, *or are perceived to increase in cost*, market share is lost to other materials. However, the level of marketing efforts and research and development investments may affect this substitution. Compared with the plastic and steel industries, the wood industry spends much less on educating and informing consumers. The forest industry is also more diversified than the competing industries making it difficult to organise effective promotional campaigns. This is one reason why forest industry products are being outperformed by competing products.

Regarding the environmental competencies of wood, consumers seem not show interest in paying more for environmentally superior products but rather expect these to be comparable in cost (Burrows & Sanness 1998). However, as costs for competing materials approach equality, consumers may prefer more environmentally friendly products.

Other substitution factors include cultural preferences, strength, ability to meet fire and other code requirements, durability, appearance and perceived value. Overall, the study of Burrows & Sanness (1998) concludes, that the wood industry needs to improve its ability to meet requirements from the customers to create new markets and to keep or win market shares.

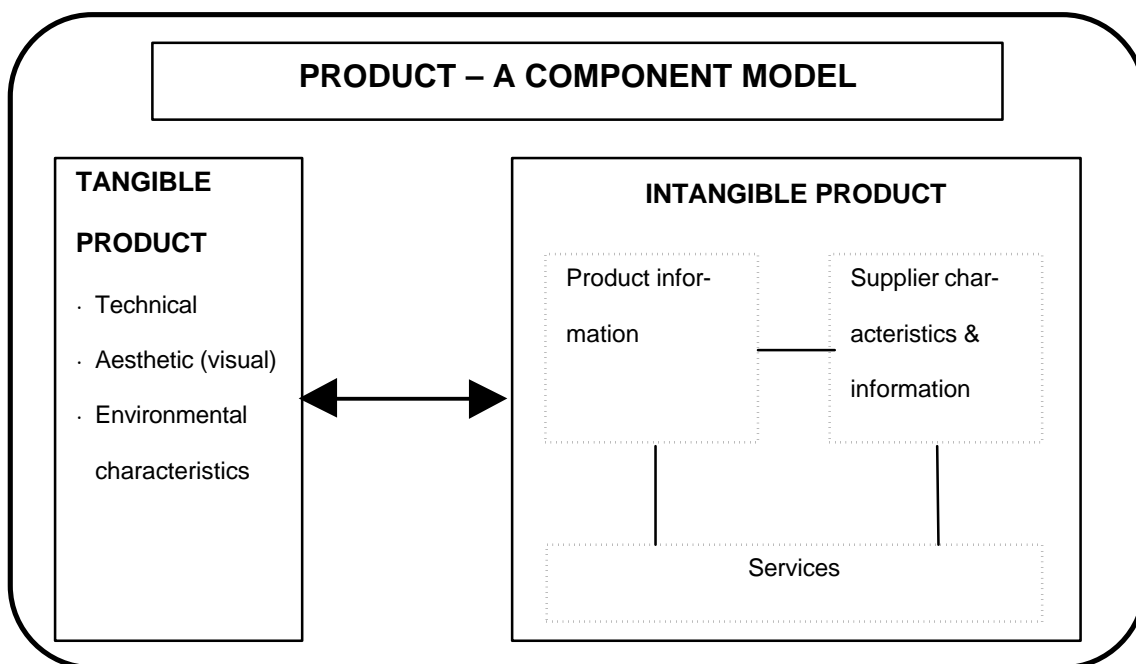
1.4.4. Theoretical framework and its operationalisation

FRAMEWORK GUIDING THE STUDY

The theoretical framework of this study consists of a product model identifying the dimensions of wood products. The concept follows the idea that a product is a bundle of benefits for a customer, and these benefits are created by physical characteristics (tangible components) and by services, information and supplier characteristics (intangible components) (Figure 2). The overall quality of a product is a combination of the quality of these product components.

The description of product-related characteristics and their quality, and also the measurement (operationalisation) of these characteristics are based on the studies of Weinwurger & Hansen (1999), Toivonen & Laurila (1997), Toivonen & Ahola (1996), Bush & Hansen (1996) and Niemelä (1996), described in chapters 1.4.1. - 1.4.3.

Figure 2. The model of wood products used in the study.



The main product components in the model are physical (tangible) and intangible. The tangible product component has the following dimensions: technical characteristics (including biological features of wood), aesthetic (visual) characteristics, and ecological characteristics. The intangible component includes three dimensions: product information (including technical product information, general image, emotional and cultural value), supplier information (“technical” information about the supplier, and “subjective” information such as supplier image and reputation), and actual services (delivery, information services, reparations, financial services etc.).

Tangible and intangible components are linked. For instance, product information can be delivered through service, but also by producing physical information tags or leaflets. In addition, environmental characteristics enhance the information and services components: environmental information is delivered through services.

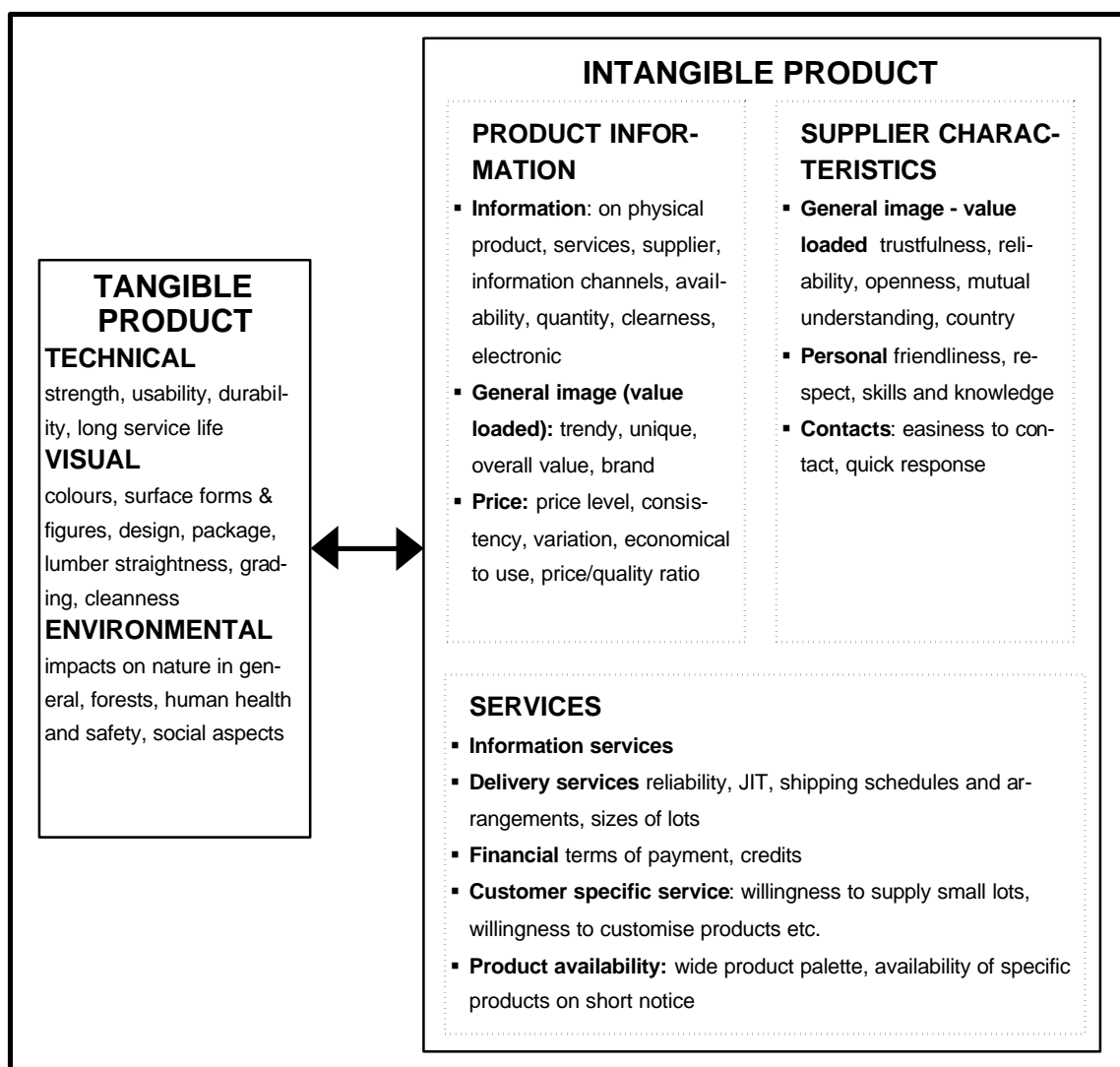
Overall, Figure 3 shows the more detailed product attributes that were identified from earlier studies for operationalisation of the product model defined for this study. A major difference between this study and the work of Bush & Hansen (1996) and Weinwurfer & Hansen (1999) is that their models excluded ecological factors. In this study, the “green component” is included based on several other studies concluding that the environment has clear importance as a quality dimension. It is even argued that the importance of ecological characteristics may vary more between market areas and customer groups than the importance of price (see Cooper et al. 1996). Therefore, ecological characteristics may be especially important for diversification and market segmentation of wood products. Other issues emphasised in this study are the aesthetic and other “subjective value dependent” product dimensions, based for instance on the observation of Weinwurfer & Hansen (1999). They have detected that producers usually underestimate the importance of aesthetics to customers. In addition, they found that the intangible product characteristics might provide the best chances to differentiate very physical products such as wood products.

Image and reputation of the product and the supplier are widely emphasised in marketing literature, and these are information by nature. Information and services are thus tightly inter-connected product components. However, most product models do not include information as a separate dimension even though information is increasingly included in all products and services: through developing processing technology, increasing requirements regarding raw material origin, and in developing more customer specific and complicated products (Toivonen 1995, Toivonen & Ahola 1996). Providing information may even be a necessity to realise the potential competitive advantages created through product development (e.g. Porter 1985).

Price is generally seen as an important product attribute. Commonly it is assumed that price delivers information about product characteristics and its quality. Therefore, price in this study is included within the information component.

Continuous contacts with customers, just-on-time deliveries, instant service etc. have also become increasingly important competitive factors in the wood industry. Hence, e-Business facilities may create a specific information/service dimension of growing importance in the wood industry (Toivonen 1995). Therefore, electronic marketing communication facilities are included in the operationalisation of the information / service component in this study (as also by Niemelä 1996).

Figure 3. Components of wood products and attributes to measure.



OPERATIONALISATION OF THE THEORETICAL FRAMEWORK

Operationalisation of the frame of reference (Figure 2 & Figure 3) is detailed in the following table. The table also shows the main areas of analysis, and refers to the questions asked in the questionnaire (Appendix 3). In this chapter, only the most important parts of the operationalisation of the theoretical framework are explained.

Table 1. Operationalisation of this study.

Area of analysis	Questions, see Appendix 3
<p>Importance of overall product properties <i>Issues to be studied:</i> Technical quality⁹, usability, visual properties (appearance), price¹⁰, environmental friendliness, services, information and logistics¹¹ and supplier characteristics</p>	1
<p>Importance of wood product characteristics <i>Issues to be studied:</i> Technical quality, usability, visual properties (appearance), price, environmental friendliness, services, information and logistics and supplier characteristics <i>Wood product groups to be studied:</i> Doors, windows, prefabricated products, kitchen cabinets, panels and mouldings, building boards (particle board, MDF, OSB, plywood), flooring materials (parquet and laminate) and sawn timber</p>	2
<p>Importance of wood product characteristics for the end-consumers <i>Issues to be studied:</i> Technical quality, usability, visual properties (appearance), price, environmental friendliness, services, information and logistics and supplier characteristics</p>	3
<p>Competence of various construction materials <i>Issues to be studied:</i> Technical quality, usability, visual properties (appearance), price, environmental friendliness, services, information and logistics and supplier characteristics Specific product characteristics of various construction materials <i>Materials to be studied:</i> Wood, plastic, steel and concrete</p>	4 12,13
<p>Ecological characteristics of the products and information related to it <i>Issues to be studied:</i> Environmental issues related with products, ways of informing environmental characteristics of the product, forest certification, origin of wood</p>	5,6,7,8,9,10,11
<p>Marketing communication <i>Issues to be studied:</i> Level of marketing communication, effectiveness of various media channels</p>	15,16
<p>Company background <i>Issues to be studied:</i> Annual turnover, main supplier countries, sales of wood products, main customer groups</p>	20,21,22

⁹ Technical tangible product were divided into technical quality (durability and consistent quality) and usability (weight and suitability of working) after the test interviews.

¹⁰ Price is dealt with one product component in this study because it is presumably very decisive in purchase decisions.

¹¹ Services, information and logistics were combined after the test interviews.

2. DATA AND ANALYSES

2.1. DATA

DATA COLLECTION

The study is based on survey data collected by a structured questionnaire (see Appendix 3). The population of the study consists of (1) construction material retailers, (2) “pure” wood product wholesalers, and (3) DIY companies in Germany (partly in Austria). The sample of construction material retailers and DIY chains was selected from these groups by locating all the existing companies and company-chains from the member list of the relevant Internet pages (e.g. <http://www.diy.de>), and from an address list available from the Nordic Timber Council (NTC). The address list of the NTC includes information about each German DIY chain, which were all contacted. Data from most wood product wholesalers was mainly gathered through a mail survey with the assistance of Der Holzring commercial company Ltd. Der Holzring is one of the leading co-operations for medium-sized timber wholesale companies for wood, boards and building materials on German markets. The aim was to cover as large share as possible from the annual Germany’s construction material trade based on turnover.

The questionnaire consists of four parts. Theme 1 was designed to describe the importance of product properties in buying decisions. The second question set (Theme 2) aims at describing ecological characteristics of the product and related information. Respondents’ knowledge of forest certification was studied only dealing with PEFC-scheme, in addition most respondents evaluated their knowledge of FSC-scheme.

The third part (Theme 3) of the questionnaire deals with specific product characteristics of various construction materials¹². The questionnaire’s last part (Theme 4) covers marketing communication, future prospects of wood product markets and related information. The results based on questionnaire’s last part (Theme 4) are reported separately (see Järvinen et al. 2001).

The intent was primarily to interview persons who were responsible for product purchases, and possibly persons who were explicitly responsible for wood product purchase. On a few occasions, one person took care of all these product procurement tasks. A letter containing information about the study and asking for an interview was sent to 95 companies or business units in total, including the mail survey target group, and 75

¹² The study of Burrows & Sanness 1998 includes also research results of specific product properties of various construction materials.

of these (approximately 80%) agreed to participate. Answers were collected from 48 of the 75 participants by conducting a personal interview on location. Due to scheduling difficulties, answers were collected from the remaining participants by mail or fax.

Personal interviews were conducted during two periods, 29 May to 26 June 2000 (interviewer 1) and 16 November 2000 to 14 February 2001 (interviewer 2). The last mail survey responses were received at the beginning of April 2001. Mail survey and interview data were statistically compared using t-test and the significance of differences is shown in Appendix 2, in Additional Table 4. Very few differences were detected. Furthermore the data of the two interviewers were compared but no differences were found.

Besides the survey data, secondary materials were utilised. Recent official industry journals, statistics, and professional periodicals were used as well as articles published on the Internet. For instance, the consulting company Ligna Con AG has described German construction material markets in its reports (see Ligna Con... 1999), and this report was utilised as background information in this study.

DESCRIPTION OF THE RESPONDENT COMPANIES / BUSINESS UNITS

Of the 75 respondent companies / business units, 18 were classified into the construction material retailers group, 20 in the wood product wholesalers group and 37 companies in the DIY chain group. Most (64) of the interviewed companies / business units locate in Germany and the rest (11) in Austria. In the analyses, Germany and Austria were not separated, because no statistically significant differences in responses were detected. In addition, most of the Austrian companies that were interviewed are the subsidiaries or business units of the German companies.

The distribution of the interviewed companies among various size classes according to annual turnover is presented in Table 2. In 2000, there were 18 merchants in Germany whose annual turnover exceeded DEM 300 million (EUR 153 million)¹³ (<http://www.bau-markt.de>). The total number of construction material entrepreneurs in Germany in 2000 was 2605 companies (<http://www.baustoffmarkt-online.de/>).

Table 2. *Companies / business units by size according to annual turnover in 1999.*

Size of company	Annual turnover, million German marks	Observations	Proportion %
Small	< 50	28	37
Medium sized	50 – 300	18	24
Large	> 300	29	39
In total		75	100

¹³ 1 EUR = 1.95583 DEM

Wood is not the main material of the respondent companies / business units. Table 3 indicates the share of wood products from the total turnover in the respondent companies. On average, about 15% of the total turnover is based on sales of wood products.

Table 3. *Share of wood products from the total turnover in the respondent companies / business units.*

	< 20%	20-40%	40-60%	60-80%	> 80%	In total
% of respondents	55	15	1	4	25	100
N	41	11	1	3	19	75

In Germany, the whole construction material trade including all product groups, industrial activities, trade forms and materials, amounted to DEM 74.9 billion (EUR 38.3 billion, EUR 1.6 in Austria) in 1999 (<http://www.baustoffmarkt-online.de/>). During the same period, wood products worth of DEM 20 billion (EUR 10.2 billion) were traded. In other words, the relative proportion of trade in wood product was around 26% (<http://www.bd-holz.de/>). The combined turnover of the all interviewed companies in 1999 was approximately DEM 56 billion / (EUR 28.6 billion), thus covering well over half of the total value of construction material markets in Germany. The combined turnover of Austrian companies amounted DEM 4.8 billion (EUR 2.4 billion) The share of wood products in the total turnover of the interviewed companies was 15%, i.e., the respondent companies covered only about a quartile of the total wood product markets.

The respondent companies / business units acquire the wood products that they market further from several supplier countries. Table 4 describes how the purchases have been distributed among various countries. Appendix 2, Additional Tables 1-3 describe distribution of purchases more thoroughly. *Germany was, almost without exception, the most important supplier country.* Austria is only a slightly more important supplier than Sweden, Finland or Canada. The group “others” mainly includes wood product suppliers from Eastern Europe. Between the three respondent groups, there was statistically significant difference between construction material retailers and wood product wholesalers’ purchases from Austria. Wood product wholesalers procure more wood products from Austria compared with construction material retailers.

Table 4. *Supplier countries’ share of the wood-product-based turnover in the respondent companies / business units.*

Share from the total wood product purchases in the respondent companies	Germany	Austria	Finland	Sweden	Canada	Others*	In total
All respondents	57.8%	11.4%	7.9%	7.0%	1.8%	14.1%	100%
Construction material retailers	70.9%	2.3%	7.1%	7.9%	1.8%	10.0%	100%
Wood product wholesalers	53.6%	15.9%	5.1%	8.2%	3.0%	14.2%	100%
DIY chains	53.9%	13.2%	9.9%	6.0%	1.1%	15.9%	100%

* others are most often suppliers from East European countries

The respondents estimated how large share of their total turnover is based on the various wood product groups. Thus, the information is not based on statistics or other secondary material but was provided by the respondents. The results regarding selected product groups are shown in Table 5, with an Additional Table 2 in Appendix 2. Sawn timber, building boards and flooring materials are the most important wood product groups based on their contribution to turnover. The share of kitchen cabinets is very low¹⁴.

Table 5. Share of various wood product groups from the total wood product turnover.

Respondent groups	Doors, windows, prefabricated products	Kitchen cabinets	Panels, mouldings	Building boards	Flooring materials	Sawn timber	Others*	Total turnover, wood products
All respondents	15.3%	2.7%	15.6%	16.7%	19.7%	21.8%	8.2%	100%
Construction material retailers	16.3%	1.2%	12.8%	18.3%	13.4%	34.3%	3.7%	100%
Wood product wholesalers	14.3%	0.6%	9.9%	25.3%	14.3%	20.5%	15.1%	100%
DIY chains	15.4%	4.6%	20.0%	11.3%	25.7%	17.5%	5.5%	100%

*Others include such products as garden furniture, children furniture and impregnated wood
 ** On average, the share of all wood products from the total turnover among respondents was 15%

Table 6 describes respondents’ main customer groups. The respondent groups were classified according to the statements of interviewed persons about their customer structure. A more detailed description of the customer structure is provided in Appendix 2 in Additional Table 3. The answers were unified in such a way that the final number of customer groups was three. Table 6 shows also that the respondent companies serve both industrial (company) customers and private consumers. In addition, Table 6 indicates that private consumers are a very important customer group.

Table 6. Contribution of sales to various customers groups from the total turnover in the respondent companies and business units in 1999.

Respondent groups	Sales to customers			Total turnover
	Construction firms	Industrial customers	Private consumers	
All respondents	17.7%	26.3%	56.0%	100%
Construction material retailers	32.8%	25.3%	41.9%	100%
Wood product wholesalers	19.6%	53.1%	27.3%	100%
DIY chains	9.4%	13.2%	77.4%	100%

¹⁴ In Germany, kitchen cabinets are mainly sold in special outlets, separate from other wood products.

2.2. METHODS OF DATA ANALYSIS

The primary data was analysed using statistical methods. For variables that were continuous by nature, means and distributions were calculated from the total sample and from the three respondent groups separately. For the respondents were explained that the alternatives in Likert-scale questions are continuous by nature, and the different alternatives locate equally apart from each other's.

The major interest in the study was to compare products, materials, and respondent groups, and therefore, to test for statistically significant differences. Regarding the Likert-scale, and other continuous variables, differences between respondent groups were tested by ANOVA, and in more detail using Tukey's HSD (honestly significant differences) pair-wise test allowing unequal sample sizes. The test indicates whether differences between respondent groups exist and their direction. The test does not indicate the extent of difference. Tukey's test is based on the maximal deviation of the means of the sample. Differences in opinions regarding various construction materials, effectiveness of media channels and supplier countries were tested using the t-test, and Bonferroni's multiple comparison method determined which materials differed significantly (Sokal & Rohlf 1995). This test is valid for equal and unequal sample sizes.

Variables measured with an ordinal scale were analysed by calculating distributions, minimum, maximum and median values. The differences between respondent groups were analysed using the Kruskal-Wallis test. This test is the most appropriate when comparing ordinal-scaled data. The test indicates whether there are differences between groups, but not the extent of the difference.

In all tests, a probability level of 0.1 was chosen to indicate significant differences. The high level of 0.1 was acceptable due to the small number of observations. In the report, only the statistically significant differences are mentioned.

Factor analysis was used in studying the dimensions of attitudes and perceptions in relation to selected characteristics (product dimensions, ecological characteristics of products, image of various materials, marketing channels). In each case, the maximum likelihood method was used as the factoring method, and the solutions were Varimax normalised rotated. An eigenvalue of at least 1.0 was used as the minimum limit for including a factor in the solution. Variables with loadings of 0.4 or higher were accepted in the interpretations of the factors. The minimum communality value of 0.2 was used in deciding whether a variable was to be excluded from the analysis.

3. RESULTS

3.1. IMPORTANCE OF PRODUCT CHARACTERISTICS – B-TO-B MARKETS

3.1.1. Materials in general

The respondent companies were asked to estimate the importance of seven different product characteristics on a 5-step scale from very important to not at all important, when they select products for their product palette (see Table 7). According to the mean values for these variables, *technical quality of product and supplier company’s characteristics* are the two most important, and thus most critical product characteristics when German construction material wholesalers and retailers purchase products. Usability, visual properties and environmental friendliness of the product are the three least important product attributes of the seven analysed, but even these attributes are, however considered rather important. The frequency distributions of the respondents’ opinions can be seen in Table 7.

Table 7. Importance of different product properties when companies select products for their product palette.

Product property	Very Important					Not at all important	Mean	n
	1	2	3	4	5			
	% of respondents							
Technical quality	76	23	1	0	0	1.3	74	
Supplier characteristics	73	20	7	0	0	1.3	74	
Services, information and logistics	35	55	8	2	0	1.6	74	
Price	46	39	14	1	0	1.7	74	
Visual properties / appearance	23	54	19	4	0	2.0	74	
Environmental friendliness	32	38	22	8	0	2.1	74	
Usability	20	38	34	5	3	2.3	74	

The importance of product characteristics was also analysed separately for three respondent groups, namely construction material retailers, wood product wholesalers and DIY chains (or home centres). When comparing the opinions of all three respondent groups simultaneously using ANOVA, statistically significant differences were detected regarding the importance of services, information and logistics and the supplier characteristics.

Moreover, when comparing each respondent group with Tukey’s test, statistically significant differences between the respondent groups were recorded regarding these same characteristics. *For the wood product wholesalers, the services, information and logis-*

tics properties are somewhat less important criteria in purchase decisions than for the construction material retailers. There were no statistically significant differences between construction material retailers and DIY chains. Similarly, the supplier characteristics are less important for the wood product wholesalers than for the construction material retailers and the DIY chains, while there was again no statistically significant difference between the construction material retailers and the DIY chains in the importance of this variable.

The importance of the different product characteristics was further analysed by producing a two-factor solution from six original variables. The seventh variable, usability, was excluded due to its low communality in the first rotation trial. The factors are described in Table 8. This two-factor solution explains 42.5% of the total variation in this variable set.

Table 8. Product dimensions in purchase decision according to factor analysis (Maximum likelihood solution with Varimax rotation).

Variable	Factor 1 "supplier, services and information"	Factor 2 "tangible product & price"	Communal- ity
Technical quality	0.093	0.485	0.244
Visual properties	0.184	0.430	0.218
Price	0.393	0.429	0.339
Environmental friendliness	0.216	0.555	0.355
Services, information and logistics	0.833	0.147	0.716
Supplier characteristics	0.602	0.394	0.517
Eigenvalue	1.300	1.089	2.389
Total variance	21.6%	20.9%	42.5%

Factor I has the highest loadings on the importance of services, information and logistics and supplier characteristics. Thus Factor I was named the supplier, services and information factor. Factor II has the highest loadings on environmental friendliness, technical quality, visual properties and price of the product. All these characteristics except price were related with the tangible product in the product model used; - thus Factor II was named as the tangible product and price factor. Overall, the factor solution separates the tangible and intangible product characteristics into different dimensions except price, which is related with the tangible product rather than with the supplier and services.

3.1.2. Wood products

3.1.2.1. Windows, Doors and Prefabricated products

For six wood product groups, the respondents were asked to rank the product properties according to their importance in purchase decision in their own company. As Table 9 shows, *technical quality* seems to be the most critical product characteristics in the purchase of windows, doors and prefabricated products. Price and usability follow technical quality. Environmental friendliness and services, information and logistics are the least decisive of the seven criteria analysed.

To summarise Table 9, it seems that *attributes related to the physical product, excluding environmental friendliness, are more decisive in the buying decision than the intangible ones* such as services, information and supplier characteristics. The low ranking of services, information and logistics and supplier characteristics is different from the general selection criteria (services, information and logistics and supplier characteristics are very important, see Table 7).

The variation of rankings between respondents is high, however. All other product properties except services, information and logistics received the minimum value of one at least from some respondent(s). Technical quality and price of the product are the only product properties that were not at all ranked with the maximum value of seven. The frequency distributions of the rankings are presented in Table 9.

Table 9. *Rankings of product properties in the purchase of windows, doors and prefabricated products.*

Windows, doors, prefabricated products	Most important							Least important	Median	n
	1	2	3	4	5	6	7			
	% of respondents									
Technical quality	70	15	8	6	0	1	0	1	66	
Price	13	23	24	21	17	2	0	3	66	
Usability	4	26	21	11	12	14	12	3	66	
Visual properties	7	18	21	17	14	17	6	4	66	
Supplier characteristics	2	9	18	11	15	24	21	5	66	
Services, information and logistics	0	9	8	20	18	24	21	5	66	
Environmental friendliness	2	3	0	14	24	18	39	6	66	

The differences of opinions between three respondents groups are described with the sums of ranks in Appendix 2 in Additional Table 5.1. According to the Kruskal-Wallis test, statistically significant differences between the three respondent groups exist in the importance of usability and supplier characteristics in selecting windows, doors and prefabricated products for the company’s product palette. *Construction material retailers*

and wood product wholesalers consider the usability of windows, doors and prefabricated products a more important product property than DIY chains. In addition, DIY chains consider supplier characteristics more important than the two other respondent groups.

3.1.2.2. Kitchen cabinets

Technical quality and visual properties are the most important criteria when the interviewed companies select kitchen cabinets for their product palette. Furthermore, usability is also considered relatively important. Therefore, the respondents consider attributes related to the physical (tangible) product as the most important, and more important than price.

Environmental friendliness, services, information and logistics are the least decisive product properties when the companies select kitchen cabinets¹⁵. The variations of rankings between minimum and maximum values support these findings concerning the importance of different kitchen cabinet properties in decision-making.

Table 10. Rankings of product properties in the purchase of kitchen cabinets.

Kitchen cabinets	Most important							Least important	Median	n
	1	2	3	4	5	6	7			
	% of respondents									
Technical quality	35	30	23	7	50	0	0	2	43	
Visual properties	26	19	21	19	4	11	0	3	43	
Usability	18	28	9	12	12	7	14	3	43	
Price	10	17	20	20	27	3	3	3	43	
Supplier characteristics	0	10	7	10	23	17	33	5	43	
Environmental friendliness	2	0	7	14	14	23	40	6	43	
Services, information and logistics	0	0	11	12	21	35	21	6	43	

Distributions of the rankings regarding characteristics of kitchen cabinets are shown in Table 10. Equally, with the doors, windows and prefabricated products, the tangible properties can be considered the most important criteria in the purchase decision and the intangible properties are least important.

Opinions of the respondents groups are compared in Appendix 2 in Additional Table 5.2. Statistically significant differences were detected between the respondent groups using Kruskal-Wallis test regarding price, environmental friendliness, services, information and logistics and supplier characteristics. Firstly, *DIY chains consider the price*

¹⁵ It should be noted that kitchen cabinets were not an important product group for most respondents and due to their small share, the results may be somewhat biased.

of the kitchen cabinets more important than construction material retailers and wood product wholesalers.

Secondly, environmental friendliness in relation to kitchen cabinets is more important for the wood product wholesalers than for the construction material retailers and the DIY chains. Thirdly, DIY chains consider services, information and logistics more important product selection criteria than the two other respondent groups.

Fourthly, supplier characteristics of the kitchen cabinet producers are more important to DIY chains than to the construction material retailers and the wood product wholesalers. The construction material retailers, for their part, consider supplier characteristics more important than the wood product wholesalers.

3.1.2.3. Panels and Mouldings

Visual properties are the most important product property of panels and mouldings, followed by technical quality and price. Thus, panels and mouldings are products where visual properties are particularly important in marketing (see Table 7 concerning the general importance of product characteristics). Environmental properties seem to have the least significance in purchase decision for panels and mouldings. In general, the respondents put slightly more emphasis on properties related to the physical product than on services when they select panels and moulding for their product palette (Table 11). The variation in the rankings is high, however.

Table 11. Rankings of product properties in the purchase of panels and mouldings.

	Most important							Least important	
	1	2	3	4	5	6	7	Median	n
Panels and Mouldings	% of respondents								
Visual properties	37	23	10	6	8	14	2	2	71
Technical quality	30	19	15	15	7	7	7	3	71
Price	24	18	32	13	10	3	0	3	71
Usability	5	17	13	20	21	13	11	4	71
Supplier characteristics	0	17	14	14	21	19	15	5	71
Services, information and logistics	0	4	10	24	13	32	17	5	71
Environmental friendliness	3	1	7	9	21	13	46	6	71

The differences in opinions between the respondent groups were analysed using the Kruskal-Wallis test (see Appendix 2, Additional Table 5.3.). Statistically significant differences between respondent groups were detected regarding the visual properties, which were considered the most important criteria in the purchase of panels and mouldings among wood product wholesalers. In addition, construction material retailers emphasise visual properties more than DIY chains.

3.1.2.4. Building Boards

The respondents consider *price and technical quality as the most important criteria when selecting building boards whereas visual properties have the least significance*. The variation in the respondents' opinions seems to be high, especially regarding the importance of supplier characteristics and environmental friendliness.

Table 12. *Rankings of product properties in the purchase of building boards.*

Building boards (Plywood, OSB, MDF, Particle board)	Most important							Least important	
	1	2	3	4	5	6	7	Median	n
	% of respondents								
Price	46	16	15	11	8	4	0	2	73
Technical quality	37	29	7	12	3	8	4	2	73
Usability	10	22	27	10	16	10	5	3	73
Supplier characteristics	4	16	15	18	20	13	12	4	73
Services, information and logistics	0	3	19	32	16	21	9	4	73
Environmental friendliness	3	8	12	10	25	19	23	5	73
Visual properties	0	5	5	8	11	25	46	6	73

The comparison of opinions between respondents groups using the Kruskal-Wallis test (Appendix 2, Additional Table 5.4.) test revealed no statistically significant differences.

3.1.2.5. Flooring materials

Technical quality is considered most important product characteristic in flooring materials (Table 13) followed by visual properties and price. As in the cases of other wood products and the general product selection criteria, environmental friendliness seems to have less significance in purchase decisions than the other product attributes.

In general, all product properties related to the physical product (tangible product) are considered more important than the intangible ones in the case of flooring materials. Opinions about the importance of price in decision-making are more evenly distributed than opinions about the other properties.

Table 13. *Rankings of product properties in the purchase of flooring materials.*

Flooring materials (parquet and laminate)	Most important							Least important	
	1	2	3	4	5	6	7	Median	n
	% of respondents								
Technical quality	54	19	6	7	7	6	1	1	70
Price	19	16	24	16	16	4	5	3	70
Visual properties	11	34	19	16	3	14	3	3	70
Usability	13	16	21	21	11	9	9	3.5	70
Supplier characteristics	0	9	16	11	24	21	19	5	70
Environmental friendliness	1	3	7	13	19	14	43	6	70
Services, information and logistics	0	4	9	16	20	31	20	6	70

Differences in opinions were compared between respondents groups using the Kruskal-Wallis test (Appendix 2, Additional Table 5.5.). Statistically significant differences were detected regarding the importance of *technical quality of flooring materials*; this was considered more important in purchase decisions for *DIY chains* than for the *construction material retailers* and the *wood product wholesalers*. For the construction material retailers, technical quality of flooring materials plays a smaller role than for the wood product wholesalers.

3.1.2.6. Sawn timber

Similarly to the building boards, *technical quality and price* are the two most important product attributes of *sawn wood* when German construction material retailers and wholesalers select this product for their product palette. These two characteristics are clearly more important than the other five product attributes analysed. Similarly to other product groups, *environmental friendliness* plays a less important role in decision-making.

Table 14. *Rankings of product properties in the purchase of sawn timber.*

Sawn timber	Most important							Least important	
	1	2	3	4	5	6	7	Median	n
	% of respondents								
Technical quality	39	24	10	13	9	4	1	2	70
Price	37	22	20	14	6	1	0	2	70
Usability	9	20	14	13	18	13	13	4	70
Supplier characteristics	6	17	23	10	14	13	17	4	70
Visual properties	7	4	7	20	19	23	20	5	70
Services, information and logistics	0	6	18	23	16	24	13	5	70
Environmental friendliness	0	7	11	7	19	20	36	6	70

The Kruskal-Wallis test (Appendix 2, Additional Table 5.6.) revealed statistically significant differences between the respondent groups in opinions regarding the importance of usability, price, and supplier characteristics. Firstly, the construction material retailers consider the usability of sawn timber to be more important than the wood product wholesalers and the DIY chains.

Secondly, the price of sawn timber is considered more important among the wood product wholesalers than among the construction material retailers and the DIY chains. For the construction material retailers, price plays a less important role than for the DIY chains. Thirdly, the DIY chains put more emphasis on the supplier characteristics of the sawn timber than construction material retailers and wood product wholesalers.

3.1.2.7. Summary

The importance of selected wood product attributes is summarised in Tables 9-14. These were also compared with “general product selection criterion” (Table 7). In Table 15 the product attributes are listed according to product group, and ranked from the most important to the least important for each product.

Table 15. Summary of the importance of product characteristics in various product groups.

	All materials (Table 7)	Windows, doors & prefabricated products	Kitchen cabinets	Panels & mouldings	Building boards	Flooring materials:	Sawn timber
1	Technical quality	Technical quality	Technical quality	Visual properties	Price	Technical quality	Technical quality
2	Supplier characteristics	Price	Visual properties	Technical quality	Technical quality	Price	Price
3	Services, information and logistics	Usability	Usability	Price	Usability	Visual properties	Usability
4	Price	Visual properties	Price	Usability	Supplier characteristics	Usability	Supplier characteristics
5	Visual properties	Supplier characteristics	Supplier characteristics	Supplier characteristics	Services, information and logistics	Supplier characteristics	Visual properties
6	Environmental friendliness	Services, information and logistics	Environmental friendliness	Services, information and logistics	Environmental friendliness	Environmental friendliness	Services, information and logistics
7	Usability	Environmental friendliness	Services, information and logistics	Environmental friendliness	Visual properties	Services, information and logistics	Environmental friendliness

Please note that the measurements between all materials and wood products have been made using different scales!!

The ranking of product properties varies quite clearly between the wood products. In general, the *order of importance of product attributes, as purchase criteria of specific wood products, is quite different from the “general product purchase situation”*¹⁶. However, it seems that technical quality is the most important product attribute both in general terms and regarding wood products. Environmental friendliness is ranked relatively low as a buying criterion, both regarding all products and wood products.

Quite clear differences between the general purchase criteria and wood products appear in ranking of supplier characteristics, visual properties, price and usability. Supplier characteristics are clearly less important when buying wood products than when buying products in general. On the contrary, usability, price and visual properties are ranked highly when buying wood products but lower in general terms.

It seems that panels and mouldings, kitchen cabinets and flooring materials are products where visual properties are of particular importance to customers as buying criteria. Visual properties are the most important selection criteria of panels and mouldings and the second most important criteria when German companies are buying flooring materials and kitchen cabinets. However, sawn wood and building boards are products for which visual properties are of relatively less importance.

Usability is a very decisive criterion in the purchase of windows, doors and prefabricated wood products, and kitchen cabinets. However, unlike visual properties, usability is also important in the selection of sawn wood and building boards.

Price is, in general, ranked as a relatively important purchase criterion for all wood products (except kitchen cabinets). Thus, the argument that price still holds a very important role in the marketing of the mechanical wood industry products seems to hold in general, and especially regarding building boards, for which price is the most important purchase criterion. The most important wood product selection criteria for each of the respondent groups are shown below in the Table 16.

When analysing only two most important buying decision criteria, it seems quite clear that technical quality is very important regarding each respondent group and each product. DIY companies strongly emphasise technical quality and price (see Table 16) whereas construction material retailers put emphasis on technical quality and visual properties of wooden products. Wood product wholesalers remain somewhere between

¹⁶ One should note that the analysis is based on the ranking of the criteria according to their importance (median values). Thus even an attribute ranked the least important may have a lot of significance in absolute terms, and is not ignored in the selection process.

these two groups; besides technical quality, price and visual properties are emphasised depending on the product group.

Table 16. *The most important wood product selection criteria according to the respondent groups.*

	Construction material retailers	Wood product wholesalers	DIY chains
Windows, Doors and Prefabricated Products	1. Technical quality 2. Visual properties	1. Technical quality 2. Price	1. Technical quality 2. Price
Kitchen cabinets	1. Technical quality 2. Visual properties	1. Technical quality 2. Usability	1. Technical quality 2. Price
Panels and Mouldings	1. Visual properties 2. Price	1. Visual properties 2. Technical quality	1. Technical quality 2. Price
Building Boards	1. Price 2. Technical quality	1. Price 2. Technical quality	1. Price 2. Technical quality
Flooring materials	1. Technical quality 2. Visual properties	1. Visual properties 2. Technical quality	1. Technical quality 2. Price
Sawn timber	1. Technical quality 2. Usability	1. Price 2. Technical quality	1. Price 2. Technical quality

3.2. IMPORTANCE OF WOOD PRODUCT CHARACTERISTICS - END-CONSUMER MARKETS

The respondents assumed that their own customers' (end-users of wood products) most important purchase criteria for wood products are *price, visual properties and technical quality* (Table 17), i.e., characteristics associated with the physical product. Tukey's test did not reveal any statistically significant differences between the three respondent groups in their opinions.

The respondents assumed that price is a more important criterion for their own customers than it is for the companies¹⁷. They also estimated that, on average, their customers rank visual properties (appearance of the product) as more important than they do themselves. Instead, the respondents assumed that environmental friendliness plays a relatively less important role when the end-users select wood products than when the companies themselves buy products.

¹⁷ The weakness of this analysis is that the end-users themselves were not asked for their decision criteria. In order to test the robustness of the result, similar data should be collected among end-consumers.

Table 17. Importance of wood product properties when end-users make purchase decisions.

	Very Important					Not at all important	Mean	n
	1	2	3	4	5			
	% of respondents							
Price	59	33	8	0	0	1.5	75	
Visual properties	41	40	15	4	0	1.8	75	
Technical quality	39	41	17	3	0	1.8	75	
Usability	16	63	15	1	5	2.2	75	
Supplier characteristics	27	40	15	12	6	2.3	75	
Services, information and logistics	11	45	32	11	1	2.4	75	
Environmental friendliness	16	19	35	22	80	2.9	75	
Attn! The results are based on the respondents' evaluation about the attitudes of their own customers								

3.3. RELATIVE COMPETENCE OF CONSTRUCTION MATERIALS

3.3.1. Technical quality

Respondents' opinions about the technical quality of the four construction materials analysed, namely wood, plastic, steel and concrete, are summarised in Table 18. *Steel is perceived as having the best technical quality*, based on the distributions and mean values of the variables. However, the differences between materials are small and the t-test did not reveal statistically significant differences. Thus, all the selected materials are considered to be of fairly high technical quality. Tukey's test revealed no statistically significant differences between respondent groups in their opinions about the construction materials' technical quality.

Table 18. Technical quality of certain construction materials.

Material	Technical Quality					Mean	n
	Very good (high)	Moderate			Very bad (low)		
	1	2	3	4	5		
	% of respondents						
Steel	44	36	14	6	0	1.8	66
Wood	26	61	16	0	0	1.9	72
Plastic	27	46	23	3	1	2.1	70
Concrete	26	45	26	3	0	2.1	66

3.3.2. Usability

According to distributions and mean values, *wood is considered the best material with respect to usability (Table 19) followed by plastic*. The difference in rankings were statistically significant (t-test). However, most of the respondents considered all of the

materials to have at least moderate usability. Tukey's test did not reveal any statistically significant differences between respondent groups in their opinions of the construction materials' usability.

Table 19. Usability of different construction materials.

Material	Usability					Mean	n
	Very good (high)	Moderate			Very bad (low)		
	1	2	3	4	5		
% of respondents							
Wood	45	43	11	1	0	1.7	73
Plastic	19	60	17	4	0	2.1	70
Steel	13	49	29	6	3	2.4	65
Concrete	9	49	30	8	4	2.5	66

3.3.3. Visual properties

The majority of the respondents consider *the visual properties of wood as good or very good*, whereas a minority of the respondents considers the visual properties of the other materials to be good (Table 20). The t-test confirms that the visual properties of wood were seen as more pleasant than those of other materials. The visual properties of plastic were considered better than those of steel or concrete, while no statistically significant differences were observed between steel and concrete. In general, the difference between materials with respect to visual properties are much clearer than in the cases of technical quality or usability.

No statistically significant differences between respondent groups in their opinions of the construction materials' visual properties were detected by Tukey's test.

Table 20. Visual properties of different construction materials.

Material	Visual properties					Mean	n
	Very good (pleasant)	Moderate			Very bad (unpleasant)		
	1	2	3	4	5		
% of respondents							
Wood	58	28	11	3	0	1.6	72
Plastic	16	33	39	7	5	2.5	69
Steel	3	18	39	32	8	3.2	66
Concrete	3	8	38	39	12	3.5	66

3.3.4. Price

The interviewed persons *perceive the price of the construction materials as being quite similar* (Table 21). The differences were tested using the t-test, but no statistically significant differences were observed.

Table 21. Price of different construction materials.

Material	Price					Mean	n
	Very good (competent)	Moderate			Very bad (incompetent)		
	1	2	3	4	5		
% of respondents							
Plastic	24	41	31	3	1	2.2	68
Wood	19	40	40	1	0	2.2	73
Concrete	19	39	38	3	1	2.3	64
Steel	14	36	44	6	0	2.4	64

Tukey’s test did not reveal any statistically significant differences between respondent groups’ opinions of the construction materials’ price.

3.3.5. Environmental soundness

Wood was considered as the relatively most environmentally sound construction material (Table 22). Steel, concrete and plastic did not differ much from each other in this respect. Differences in opinions about the environmental friendliness of the materials were tested for statistical significance using the t-test. The results confirm that wood is considered more environmentally friendly than the other materials. The respondent groups did not differ statistically significantly from each other in their opinions (Tukey’s test).

Table 22. Environmental friendliness of different construction materials.

Material	Environmental friendliness					Mean	n
	Very high	Moderate			Very low		
	1	2	3	4	5		
% of respondents							
Wood	62	25	9	1	3	1.6	73
Steel	8	25	46	15	6	2.9	65
Concrete	6	18	41	29	6	3.1	66
Plastic	12	7	32	33	16	3.3	69

3.3.6. Services, information and logistics

On average, the quality of services, product-related information and logistics were perceived as being between fairly good and moderate regarding all four materials ana-

lysed, and no statistically significant differences were detected between materials in this respect (t-test). Tukey's test did not reveal any statistically significant differences between respondent groups in their opinions either.

Table 23. *Services, information and logistics of different construction materials.*

Material	Services, information and logistics					Mean	n
	Very good (high)	Moderate			Very poor (low)		
	1	2	3	4	5		
	% of respondents						
Wood	10	46	38	3	3	2.3	71
Plastic	8	53	35	0	4	2.3	66
Steel	5	50	37	5	3	2.4	62
Concrete	11	40	37	7	5	2.4	62

3.3.7. *Supplier characteristics*

The respondents had very similar opinions of the suppliers of the various materials: The suppliers of all materials were perceived performing relatively well on average. Relatively few of the respondents regard any of the materials to be inefficient or very inefficient with respect to supplier characteristics. No statistically significant (t-test) differences were found between materials regarding the perceptions of supplier characteristics, and no statistically significant differences between respondent groups' opinions were detected either (Tukey's test).

Table 24. *Supplier characteristics of different construction materials.*

Material	Supplier characteristics					Mean	n
	Very good (efficient)	Moderate			Very bad (inefficient)		
	1	2	3	4	5		
	% of respondents						
Plastic	22	53	21	1	3	2.1	68
Wood	26	49	17	4	4	2.1	71
Steel	17	56	22	2	3	2.2	63
Concrete	19	53	22	3	3	2.2	63

3.3.8. *Total competence of construction materials*

The overall competence of the materials was first analysed by forming simple competence index that summarises the information of the original product characteristic variables described in Chapters 3.3.1. - 3.3.7. The index variable is based on the sums of the mean values of the original variables for each material (technical quality, usability, visual properties, price, services-information-logistics, and supplier characteristics). The

index variable could have values between 7-35. The smaller the value is, the better is the competence.

Based on this simple competence index, it appears that *wood has the best overall competence* on the German construction material markets, with the lowest index value of 13.4. However, *all four materials are generally considered to have at least a moderate overall competence*, and the index values of all materials are within the relatively narrow span of 13.4-18.1. No statistically significant differences in opinions between respondent groups were detected either using ANOVA or Tukey’s test.

Table 25. *The materials’ overall competence.*

Product characteristic	Wood	Plastic	Steel	Concrete
	Means			
Technical quality	1.9	2.1	1.8	2.1
Usability	1.7	2.1	2.4	2.5
Visual properties	1.6	2.5	3.2	3.5
Price	2.2	2.2	2.4	2.3
Environmental friendliness	1.6	3.3	2.9	3.1
Services, information and logistics	2.3	2.3	2.4	2.4
Supplier characteristics	2.1	2.1	2.2	2.2
Material’s competence Index *	13.4	16.6	17.3	18.1
Range of observations	7 to 23	7 to 24	10 to 28	11 to 24

* Minimum value = 7 (high competence), Maximum value = 35 (low competence)

Next, the mean values of the materials’ characteristics were first weighted by the general importance of the characteristics as overall purchase criteria (shown in the Table 7, page 21). These weighted values were then summarised for each material. However, as by using the simple index, *wood receives the best value indicating high overall competence also by using this weighted competence index*. The clearest differences between the materials appear in visual properties and environmental friendliness, which are the particular strengths of wood in comparison with other materials.

Table 26. *Materials’ competence using weighted indexes.*

Product characteristic	Weight, from Table 7	Wood	Plastic	Steel	Concrete
		Means			
Technical quality	1.3	2.5	2.7	2.3	2.7
Usability	1.3	2.2	2.7	3.1	3.3
Visual properties	1.6	2.6	4.0	5.1	5.6
Price	1.7	3.7	3.7	4.1	3.9
Environmental friendliness	2.0	3.2	6.6	5.8	6.2
Services, information and logistics	2.1	4.8	4.8	5.0	5.0
Supplier characteristics	2.3	4.8	4.8	5.1	5.1
Material’s weighted competence index		23.8	29.3	30.5	31.8
Range of observations		12 to 41	12 to 43	17 to 51	19 to 44

No statistically significant differences between respondent groups' perceptions were detected using Tukey's test and ANOVA. In spite of this, the large range of the index values for each material shows that individual respondents may have rather different opinions about the performance of the materials.

3.3.9. *The image and quality of materials*

Table 27 shows the mean values of variables describing the construction materials' overall image. *Wood is estimated to have the best overall image with respect to all characteristics except for the cleanness and neatness of the packaging and the youthfulness of the material, for which plastic was considered slightly better.*

The materials appear to differ significantly from each other according to the results of t-test (see Appendix 2, Additional Table 7). However, in general it can be said that wood is considered significantly better than the other materials with respect to overall visual properties and style.

Table 27. *Construction materials' overall image – quality related to visual properties and style.*

Overall Image	Material			
	Wood	Plastic	Steel	Concrete
	Means			
Material is individual	1.4	2.6	3.1	3.5
Material is warm and attractive	1.2	3.2	4.3	4.4
Material has pleasant visual properties	1.2	2.6	3.4	3.9
Material is stylish	1.6	3.3	3.3	3.8
Material is modern	2.0	2.1	2.3	2.9
Material is old fashioned	3.3	3.3	3.5	3.3
Material is valuable	1.8	3.3	2.9	3.6
Material is youthful	2.4	2.3	2.7	3.2
Package is clean and neat	2.3	2.0	2.9	3.3
General image of the material is high	1.8	2.9	2.7	3.3

(1= very good, 2= good, 3= moderate, 4= bad, 5= very bad)

Table 28 describes the image of materials related to *economic quality and market characteristics*. Mean values and distributions of individual variables show that *the differences between materials are small*. Respondents' opinions vary regarding the stability of supply. Some differences in means were detected with the t-test (see Appendix 2, Additional Table 7). Most clear difference is that *the supply of steel and concrete is perceived more stable than the supply of wood or plastic*.

Table 28. Construction materials’ economic quality and market characteristics.

Economic characteristics	Materials			
	Wood	Plastic	Steel	Concrete
	Means			
Material is easily available	1.7	1.9	2.1	1.9
Supply of the material is stable	2.2	2.7	1.4	1.5
Processing costs of the material are low	2.3	2.5	2.8	2.5
Material is inexpensive	2.5	2.2	2.7	2.3
Price of the material is stable	2.8	2.7	2.7	2.4
Price-quality ratio of the material is good	2.1	2.3	2.4	2.4
Use value of the material is good	2.0	2.2	2.3	2.5
<i>(1= very good, 2= good, 3= moderate, 4= bad, 5= very bad)</i>				

The four materials were seen to perform quite similarly in terms of availability and quality of product and supplier related information. Wood and plastic appear to perform slightly better than concrete, and concrete a little better than steel. Differences between materials were tested using the t-test (see Appendix 2, Additional Table 7), but no significant differences were detected.

Table 29. Construction materials’ informational quality.

Information characteristic	Materials			
	Wood	Plastic	Steel	Concrete
	Means			
Product information about material is understandable and simple	2.3	2.4	2.6	2.5
Information about the material/products is easily available	2.2	2.4	2.5	2.3
Information about suppliers is easily available	2.5	2.5	2.6	2.5
Information about material is available via the Internet	2.5	2.5	2.7	2.6
Product information (labels) are good and informative	2.4	2.4	2.6	2.5
<i>(1= very good, 2= good, 3= moderate, 4= bad, 5= very bad)</i>				

Mean values for the environmental characteristics of the materials are shown in Table 30. Wood is perceived as the most environmentally friendly of the four materials analysed. The other three materials are estimated to be moderately environmentally friendly. The differences between materials were tested using t-test (see Appendix 2, Additional Table 7). For each characteristics related with ecological and social quality, the difference between wood and other materials was statistically significant.

Table 30. Construction materials' ecological and social quality.

Environmental characteristic	Materials			
	Wood	Plastic	Steel	Concrete
	Means			
Material is environmentally friendly	1.4	3.5	2.8	3.1
Material is socially acceptable	1.8	2.8	2.6	2.7
Products have an eco-label	1.9	3.5	3.7	3.6
Material is safe and non-hazardous	1.7	2.9	2.3	2.5

(1= very good, 2= good, 3= moderate, 4= bad, 5= very bad)

Table 31 summarises the *technical image of the four materials*. Each material appears to be associated with specific characteristic. Therefore it is difficult to determine which material performs better or worse than the others in general terms. The results shown in Table 31 even appear to conflict somewhat with those in Table 18, in which concrete was rated as the relatively weakest material concerning technical quality. In this more detailed analysis of the technical characteristic of each material in Table 31, concrete seems to perform much better. Means were also compared using the t-test, and results are shown in Appendix 2, in Additional Table 7. The differences between the pairs wood - plastics and steel – concrete are the clearest.

Table 31. Construction materials' technical quality.

Technical product characteristic	Materials			
	Wood	Plastic	Steel	Concrete
	Means			
Material is statically strong	2.1	3.4	1.7	1.6
Material is ease of care	2.6	1.8	2.5	2.5
Material is durable	2.4	2.1	1.9	1.7
Material is easy to process	1.7	2.6	3.2	3.2
Quality of the material is stable	2.7	2.1	1.9	2.2
Material is non-flammable	3.2	3.4	1.6	1.4

(1= very good, 2= good, 3= moderate, 4= bad, 5= very bad)

Table 32 describes the perceived comparative advantages or strengths of the four materials. In the Table 32, those five to six attributes per materials are mentioned where the various materials received best estimations according to mean values. It appears that *wood has particularly strong image based on visual properties, style and environmental soundness*. The strengths of plastics are its good economic performance and durability, together with its youngish (modern) image. The competencies of both steel and concrete are their technical quality. Additional Table 6, in Appendix 2, shows the specific material properties in detail.

Table 32. *Materials' competencies.*

	Advantages	Mean values (see also Additional Table 6, in Appendix 2)
Wood	+ warm and attractive	1.2
	+ pleasant visual properties	1.2
	+ environmentally friendly	1.4
	+ individual	1.4
	+ stylish	1.6
Plastic	+ ease of care	1.8
	+ easily available	1.9
	+ package is clean and neat	2.0
	+ modern	2.1
	+ durable	2.1
	+ quality is stable	2.1
Steel	+ supply is stable	1.4
	+ non-flammable	1.6
	+ statically strong	1.7
	+ quality is stable	1.9
	+ durable	1.9
Concrete	+ non-flammable	1.4
	+ supply is stable	1.5
	+ statically strong	1.6
	+ durable	1.7
	+ easily available	1.9

(1= very good, 2= good, 3= moderate, 4= bad, 5= very bad)

3.4. ENVIRONMENTAL IMAGE AND MARKETING COMMUNICATION

3.4.1. Importance of environmental quality

The interviewed persons were asked how large a proportion of their company's customers pays attention to the environmental friendliness of the products they buy. The question dealt with products in general, not wooden products in particular. It seems that construction material trading companies in Germany generally believe that only a minor proportion of their own customers, i.e. mainly the German end-consumers, pays attention to the environmental characteristics of the product (Table 33).

Table 33. *The proportion of the customers paying attention to the environmental friendliness of products as estimated by the respondents.*

	Share of the respondent company's own customers								In In to- tal
	< 10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	> 70%	
	From the respondents								
n	24	13	11	5	8	5	7	2	75
%	32	17	15	7	11	7	9	2	100

The respondents also were also asked to estimate how willing their customers are to pay a price premium for environmentally sound products (Table 34): Approximately *two-thirds of the respondents assume that less than 20% of their own customers would pay extra for environmental friendly products*. The respondents most often named well-educated persons with small children, as the most likely customer segment to pay a “green” price premium.

Table 34. *The proportion of those customers who are willing to pay an "environmental price premium" according to the respondents.*

Respondent companies	Share of the company's own customers					In In total
	0%	1-10%	11-20%	21-30%	> 30%	
	% of respondent companies					
n	5	44	19	5	2	75
%	7	58	25	7	3	100

In Table 35, those wood product groups are listed that were the most often mentioned as the ones for which the end-consumers (customers) would pay a “green price premium”. In general, the respondent companies seem to assume that *the German consumers are most willing to pay extra for wood products which are used for interior decoration purposes, such as flooring materials, panels and ceilings*.

Table 35. *Wood products for which customers might pay “a green price premium”, estimated by the respondents.*

Rank	Wood product	The number of respondents who named the product (The total number of respondents is 75)
1	Parquet	27
2	Laminate	16
3	Panels	15
4	Furniture	13
5	Building boards	9
6	Semi-finished products	9
7	Massive timber products	6
8	Tropical timber	3
9	Impregnated wood	2
10	Cork products	1
11	Glue laminated products	1
12	Wood pellets	1

3.4.2. Dimensions of environmental quality

The importance of various product characteristics that relate to a product's environmental quality, and thus build up its eco-image are described in Table 36. *Product safety is considered the most important environmental characteristic of wooden products. Wood originating from sustainably managed forests is the next most important matter. General impacts on nature were also seen as important. Availability of infor-*

mation on environmental aspects is also an important part of environmental quality. The possibility to recycle and social impacts were considered to be of moderate importance.

Statistically significant differences (Tukey’s test) between respondent groups were found regarding surface treatment: The construction material retailers and the DIY chains consider this environmental characteristic more important than the wood product wholesalers.

Table 36. Importance of the environmental characteristics of a product.

Environmental property	Very important					Not at all important	
	1	2	3	4	5	Mean	n
	% of respondents						
Product is safe to health	75	21	4	0	0	1.3	75
Surface treatment of the product is safe	40	44	13	3	0	1.8	75
Wood originates from sustainably managed forests	31	44	24	1	0	2.0	75
Availability of information about the environmental factors and impacts	24	40	26	7	3	2.2	75
Environmental impacts of the production are small	19	43	31	7	0	2.3	75
Possibility to recycle the product	18	29	37	9	7	2.6	75
Recyclable packaging materials	9	29	33	18	11	2.9	75
The social aspects are respected (needs of local people, no child labour etc.)	7	21	36	27	9	3.1	75

The dimensions of the environmental quality of products were further studied by factor analysis. A three-factor solution from the eight original variables was produced. The resultant dimensions are described in Table 37. This three-factor solution explains 53% of the total variation in the variable set.

Table 37. Dimensions of environmental quality of products according to factor analysis (Maximum likelihood solution with Varimax rotation).

Variable	Factor I “ Sustainable forest management”	Factor II “Recyclability, general impacts on environment and social aspects”	Factor III “Human health and availability of information”	Communality
Wood originates from sustainably managed forests	0.936	0.136	0.001	0.894
Environmental impacts of production are small	0.404	0.577	-0.141	0.515
Possibility to recycle the product	0.064	0.775	0.160	0.631
Recyclable packaging materials	-0.014	0.730	0.198	0.572
Safe (no danger to health)	-0.191	0.296	0.552	0.429
The social aspects (e.g. needs of local people, no child labour etc.) are respected	0.192	0.454	0.224	0.292
Safe surface treatment	0.031	0.010	0.733	0.538
Availability of information about the environmental matters and impacts	0.200	0.380	0.409	0.352
Eigenvalue	1.157	1.922	1.143	4.223
Total variance	14.5%	24.0%	14.3%	52.8%

Factor I has a very high loading on the variable that wood originates from sustainably managed forests, and some on the variable indicating the environmental impacts of production. Factor I is named “Sustainable forest management”, since this variable is very dominating.

The environmental impacts –variable gets a higher loading on Factor II. Factor II has the highest loadings on possibility to recycle the product, and on recyclable packaging materials. Thus, Factor II is named “Recyclability and general impacts on environment”. Social matters are also tied with this dimension. Factor III has the highest loadings on safety of the product and safe surface treatment, and somewhat on availability of information about the environmental matters and impacts. Thus, Factor III is named “Human health and availability of information”.

3.4.3. Communication of environmental quality to consumers

As mentioned in the previous chapter, the availability of information about environmental impacts forms a part of the environmental quality of a product. Thus, the effectiveness of media channels delivering this information to consumers were analysed in more detail.

As shown in Table 38, based on distributions and mean values of variables, an eco-label attached to the product is perceived as the most efficient way of informing con-

sumers about the environmental characteristics of products. Product information tags with eco-information or specific leaflets providing eco-information are perceived almost equally efficient means. The perceived differences between various media were statistically significant (t-test). Thus, it seems that the respondents find product specific information which is physically attached to products most efficient in delivering environmental information for consumers. However, all the media were still regarded as rather efficient. No significant differences between respondent groups in their opinions were detected (Tukey’s test).

Table 38. Effectiveness of various media in informing the final consumers about environmental characteristics of products in Germany.

	Very effective					Not effective at all	Mean	n
	1	2	3	4	5			
	% of respondents							
Eco-label attached to the products	40	40	16	3	1	1.9	75	
Product information tag includes environmental info	29	51	16	4	0	1.9	75	
Information leaflets with eco-information	30	44	24	1	1	2.0	75	
Certificate of origin	22	42	26	10	0	2.3	75	
Campaigns in the press	23	39	29	5	4	2.3	75	
Campaigns in TV	19	33	36	9	3	2.4	75	

The effectiveness of different media in informing consumers about the environmental friendliness was further studied by producing a two-factor solution from the original six variables. The “certificate of origin” variable was excluded due to its low communality in the first rotation round. The resulting dimensions are described in Table 39. This two-factor solution explains 54% of the total variation in the original variable set.

Table 39. Ways of informing consumers about environmental characteristics of products according to factor analysis (Maximum likelihood solution with Varimax rotation).

Variable	Factor I “General Campaigns”	Factor II “Product specific information”	Communality
Eco-label attached to the products	0.161	-0.628	0.420
Product information tag includes environmental information	-0.106	-0.722	0.532
Information leaflets with eco-information	0.034	-0.543	0.296
Campaigns in the press	-0.734	0.049	0.541
Campaigns on TV	-0.942	0.025	0.889
Eigenvalue	1.465	1.214	2.679
Total variance	29.3%	24.3	53.6%

Factor I has the highest loadings on campaigns in the press and special campaigns on TV. Both these mass media channels provide background information about environmental issues on an untargeted audience. Thus Factor I is named a general campaign factor.

Factor II has a high loading on eco-label attached to the product, product information tags including environmental information, and on information leaflets with eco-information. Eco-labels and information tags are directly attached to the physical product, and information is specifically about that very product. Thus, factor II is named a product specific information factor.

3.4.4. Forest certification schemes and origin of wood

Table 40 summarises results regarding the awareness of German construction material companies of the two large forest certification schemes: *PEFC* and *FSC*. The results show that the *FSC* –certification scheme is slightly better known among the respondents (in late 2000 – early 2001).

Table 40. Knowledge of forest certification schemes.

Certification scheme	No Knowledge		Some Knowledge		Considerable knowledge		In total	
	From the respondents							
	%	n	%	n	%	n	%	n
PEFC	44	33	32	24	24	18	100	75
FSC	32	16	33	17	35	18	100	51

Table 41 presents the end-consumers' assumed interest toward the origin of wood in the buying decision (estimated by the company respondents). The origin of wood is estimated to interest consumers only fairly rarely.

Table 41. End-consumers' assumed interest toward the origin of wood.

Respondent companies	"Customers are interested in the origin of wood"				In total
	Often	Sometimes	Seldom	Never	
	From the respondents				
n	6	39	25	5	75
%	8	52	33	7	100

3.5. MARKETING COMMUNICATION

3.5.1. Activity of construction material suppliers in marketing

Table 42 shows the respondents' perceptions of activity in marketing communication of the construction material suppliers. Based on distributions and the mean values of variables, *wood product suppliers are perceived to be the most active in marketing*, while steel suppliers are perceived to be the least active¹⁸.

¹⁸ The result needs to be treated with some caution. For example, the wood product wholesalers may have relatively little business with steel or concrete suppliers and this may be reflected in the responses.

Some statistically significant differences between material suppliers were detected using t-test, and these confirm the above implication: Wood and plastic suppliers are perceived to be more active in marketing communication than the suppliers of steel products. The suppliers of concrete were perceived to be more active in marketing than the suppliers of steel products. However, generally the activity of suppliers of all the four materials was perceived being from moderate to fairly good, and the differences between materials were small.

Table 42. Activity of various construction material suppliers in marketing communication.

Material	Very active					Not Active at all	Mean	n
	1	2	3	4	5			
	% of respondents							
Wood	13	47	33	6	1	2.3	75	
Plastic	16	34	42	7	1	2.4	70	
Concrete	10	27	38	19	6	2.8	68	
Steel	1	12	44	37	6	3.3	68	

3.5.2. Marketing activity of various supplier countries

The respondents were asked about their opinions of various supplier countries' activity in marketing of wood products. The distribution of opinions is presented in Table 43. Based on the mean values, *German wood product suppliers are perceived as being the most active in the marketing of wood products.* T-test confirms that the difference between German suppliers and the others is statistically significant. In addition, Austrian, Swedish and Finnish suppliers were considered more active in marketing than the Canadian suppliers.

ANOVA and Tukey's tests also show that the wood product wholesalers perceive German suppliers as even more active in marketing than the DIY chains. In addition, the wood product wholesalers consider the Austrian suppliers more active in marketing of wood products than the DIY chains and construction material retailers do. There were no statistically significant differences between the respondent groups' perceptions regarding the other supplier countries.

Table 43. Marketing activity of wood product suppliers from various countries.

Suppliers from:	Very active					Not Active at all	Mean	n
	1	2	3	4	5			
% of respondents								
Germany	16	43	27	11	3	2.4	73	
Finland	13	26	39	17	5	2.8	70	
Austria	7	28	39	19	7	2.9	69	
Sweden	6	25	42	14	13	3.0	69	
Canada	0	10	45	25	20	3.6	64	

3.5.3. The contemporary level of marketing communication

Table 44 summarises the respondents' opinions about the contemporary level of marketing communication of wood product suppliers. The results indicate that *a majority of the respondents would like the wood product suppliers to increase their marketing efforts, although wood product suppliers are already considered more active in marketing than the suppliers of other construction materials* (see Table 42).

Table 44. The contemporary level of wood product suppliers marketing activity.

Respondent Companies	On a suitable level	Should be slightly more active	Should be clearly more active	Could be even less active	In total
% of respondents	24	44	32	0	100
n of respondents	18	33	24	0	75

3.5.4. Media for marketing of wood products

The respondents evaluated the quality of different channels in marketing wood products. According to distributions and mean values (Table 45) *technical and professional journals are considered as the most suitable channels in marketing of wood products, followed by brochures and exhibitions*. Newspapers, TV and Internet were evaluated to be the least valuable channels in marketing of wood products. In general, it seems that the channels targeted at special customer segments are perceived more suitable than the channels aimed at the general public.

The differences in opinions about the various media channels were examined using the t-test and the results are presented in Appendix 2, in Additional Table 8. Technical journals and brochures are considered better than newspapers, magazines and the Internet. However, the differences in opinions on suitability of different media channels were fairly small: All channels were ranked from moderately to fairly well suitable in marketing of wood products. Tukey's test did not reveal any statistically significant differences between the three respondent groups in their opinions.

Table 45. Suitability of various channels in marketing wood products.

Channel	Very good					Not good at all	Mean	n
	1	2	3	4	5			
	% of respondents							
Technical journals	29	48	20	3	0	2.0	75	
Brochures	19	51	27	2	1	2.2	75	
Exhibitions	20	49	23	8	0	2.2	75	
Magazines	15	32	43	10	0	2.5	75	
Internet	16	36	28	20	0	2.5	75	
TV	28	21	24	20	7	2.6	75	
Newspapers	14	20	47	19	0	2.7	75	

The channels in the marketing of wood products were further studied by producing a two-factor solution from the seven original variables (Table 46). The solution explains only 34% of the variation in the total variable set.

Table 46. Factor analysis of media channels in marketing wood products (Maximum likelihood solution with Varimax rotation).

Variable	Factor I “Mass media channels”	Factor II “Targeted media channels”	Communality
Newspapers	0.675	0.033	0.457
Journals	0.560	-0.035	0.315
Technical/ Professional journals	-0.037	0.512	0.264
TV	0.585	-0.120	0.357
Exhibitions	-0.179	0.674	0.486
Brochures	0.235	0.466	0.272
Internet	0.401	0.260	0.299
Eigenvalue	1.36	1.02	2.38
Total variance	19.5%	14.5%	34.0%

Factor I has the highest loadings on newspapers, journals, TV and the Internet and is therefore labelled as “Mass media channels” factor. Factor II has the highest loadings on technical journals, brochures and exhibitions, thus it is named as “The targeted media channels” factor.

Overall, the results of the factor analysis confirm that the media channels can be divided into untargeted mass media and more specified channels. Table 45 allows concluding that the targeted channels are considered somewhat more suitable in marketing of wood products than the mass media channels.

Overall, this result resembles somewhat the results of the analysis of the efficiency of various channels for delivering environmental information (see Chapter 3.4.3): In both cases the media channels / type of information seems to form two dimensions; product specific and targeted channels/information, and the mass media/ more untargeted information.

4. SUMMARY AND CONCLUSIONS

BACKGROUND

This study focuses on wood related opinions of the construction material wholesaler and retailer companies in Germany, some of which have operations in other countries, too. The image of wood is described, and the critical product characteristics when companies purchase wood products are identified. The expected development of wood product markets is described in a separate report (Järvinen et al. 2001).

The data comprises 75 companies/business units (18 construction material retailers, 20 wood product wholesalers and 37 DIY chains). The primary data was collected through personal interviews (49) and a mail survey (26). Most (64) of the interviewed companies / business units locate in Germany and the rest (11) in Austria. The added turnover of the companies is 75% of the value of the total German construction material trade DM 75 billion in 1999 (EUR 38.3 billion, EUR 1.6 billion in Austria). The sample of the study is quite representative in this respect. The sales of wood products were relatively smaller in the respondent companies than on average on the German building material markets. Anyhow, the results should not be biased by particularly favourable attitudes toward wood. Limitations include the fact that in most cases only one person was interviewed in a business unit. In addition, consumer data were not collected in this study.

MAIN RESULTS

Building products are perceived as having at least two components or dimensions: the physical product and related services (the latter including supplier characteristics). According to the preliminary assumptions of the study, visual properties and environmental issues are perceived as related to the physical product, and product information with services. Instead, against preliminary assumptions, price was associated with the physical product component. In spite of this, the overall result is in accordance with the earlier studies showing that the concept of a product is pan-dimensional.

On the German B-to-B construction materials' markets, the most important general purchase criteria of products are technical quality and supplier characteristics. In purchasing particularly wood products, technical quality and price are also very important. Visual properties and usability are also among the most important criteria. For example, technical quality and price are the most decisive criteria for sawn wood and building boards. Visual properties are very important in the purchase of panels, mouldings, kitchen cabinets and flooring materials.

The German construction material companies generally believe that their own customers *consider price as the most important decision criteria* when they buy wood products, followed by visual properties and technical quality. The companies assume that their customers emphasise particularly the visual properties even more strongly than the companies themselves. The result is in accordance with the findings of Kühn & Becker (1999) and Rametsteiner (1999).

Although the environmental characteristics clearly matter in buying construction materials, these are not the most important criteria. This is believed to regard both the companies and their customers. However, certain consumer groups, such as well-educated families with children, are assumed to emphasise environment quite strongly. This study indicates that the environmental quality consists of three dimensions: 1)human health (most important), 2)sustainability of forestry and 3)recycling and general impacts on nature. Environmental quality is most critical in the marketing of furniture, flooring materials, panels and other interior decoration products. FSC certification is slightly better known among respondents than PEFC certification.

The general image of wood seems to be good compared with other materials on the German markets. The main competencies of wood are related to its visual properties, style and environmental quality (aesthetic and green product components). Regarding these characteristics, wood outperforms the other materials analysed in this study.

However, wood does not have competitive advantages or disadvantages regarding the most important general purchase criteria (technical quality, supplier characteristics). The main weaknesses of wood, in comparison with other construction materials, are related with some technical properties: *Even though the quality of wood material is considered as moderately stable, it is considered more unstable compared with other building materials.* Wood and plastics are also considered less resistant to fire, when compared with steel or concrete. In addition, although wood is considered fairly durable, it is still considered less durable than the other materials analysed.

The results also imply that price stability of wood products could be improved, even though wood performs in this respect equally with other materials. In addition, availability of information on wood products and their suppliers could be better, although the producers of the other materials are not any ahead in this aspect.

Wood product suppliers were perceived to be more active in marketing communication compared with suppliers of plastic, steel and concrete products. This result is in contrast with some earlier studies (Burrows & Sanness 1998). In spite of this, the German companies / business units wish for increased activity in marketing from the wood product

suppliers, and co-operation in organising campaigns for adding the demand for wood products.

Table 47. *The main findings and implications of the study.*

SUMMARY

- Visual properties, good general image, style, usability, and high social and environmental quality are the main strengths of wood. Especially important these are in marketing of wood products for inner decoration and for furniture manufacturing purposes.
- Development of marketing communication and products could be based more strongly on the particular strengths of wood. Particularly, the visual attractiveness of wood, health matters and social acceptance would deserve more emphasis. Creating a new brand image for wood, based on its high aesthetical, environmental and social status is an opportunity to increase the demand for wooden products.
- Technical properties and market properties are the main challenges in developing wood products; price and quality of wood products are perceived as only moderately stable. Wood is also perceived only moderately fire resistant.
- The Finnish (and other foreign) wood product suppliers should increase their activity in marketing, because the domestic (German) suppliers are perceived more active than the foreign suppliers.
- Particularly, information on wood products and suppliers is perceived being available only moderately easily. Thus, this is a field, where increased marketing efforts might help the Finnish suppliers to increase their competitive position.
- The German construction material companies stressed the need for image campaigns to promote the use of wood among consumers. In general, there are good reasons to consider the end-users even more strongly than earlier when developing marketing communication. Developing product information/other marketing material targeted at end-consumers, and providing this material for the use of the retailer companies would also be an opportunity for increasing co-operation between primary producers and retailers.

CONCLUSIONS AND MANAGERIAL IMPLICATIONS

As emphasised earlier, this study shows that the perceived high environmental quality is an important competence of wood. This should be taken into consideration in building wood's "brand image", even though environmental matters do not belong to the most important product selection criteria. Another conclusion is that the efforts made to communicate the environmental soundness of wood in the markets have been effective.

Unfortunately, there seems to be only limited possibilities to get a price premium based on environmental quality. It may be possible for some products and consumer segments. But for many wood products, high environmental quality alone is probably not enough

to get a higher price. However, this study points out an important additional matter linked with the environmental quality, namely the health aspect. Therefore, it is strongly suggested that wood product suppliers should place *more emphasis on health aspects* both in product development and in developing the contents of the environmental quality and marketing communication of wooden products.

This study also points out that visual properties and good social acceptance are other clear competencies of wood, which might have received too little attention in marketing so far. In fact, this *“social-aesthetic quality” may be at least equally strong competence of wood than the environmental quality, because these product characteristics may appeal a larger and perhaps different consumer groups than the environmental aspects.*

However, remembering that the most important environmental dimension of wood is connected with health, environmental and aesthetic-social qualities may even represent the same phenomenon: values related with pleasure and status – a kind of prestige for an individual. Therefore, *marketing of wood products should be based more clearly on all these strengths; the “aesthetic-social-environmental quality”*. In practice, increasing the demand of wood products requires building a new high “brand image” for wood products. This would indicate aesthetic taste and style, but also refer to a lifestyle respecting environment and pursuing social responsibility.

In fact, it is a question of a brand-image of wood representing a certain kind of life style. The mix of uniqueness and conformism creates consumer groups with different life styles. At the same time, consumers want to be individual and distinguish themselves from other people, and to belong to a group where they can feel being similar with other people. Belonging to a group helps consumers to gain security through shared norms and values. The visual properties of wood offer a way to be unique, and the environmental and social aspects help consumers to belong to a certain group. If trying to name this life style group, they could be called such as “green aesthician” or something similar.

More stable quality, and fluent logistics are challenges for wood products in competing with other materials. Particularly the DIY chains are not satisfied with the marketing activity of wood product suppliers, especially that of foreign suppliers. Perhaps also the sawmills and board manufacturers should put more effort into developing services and logistics, and improving the availability of information on products and suppliers. Participating in image campaigns to accelerate the consumption of wood among end-consumers is an example of potential ways of increasing marketing activity.

Overall, research in the future should identify the consumer segments with different preferences. The willingness to pay a price premium for visual properties or environ-

mental friendliness should be investigated in particular. In general, the health aspect in wood products deserves more attention, first in research and then in marketing. Competencies of massive wood products in comparison with wood-based substitutes are also an especially interesting issue for the future research.

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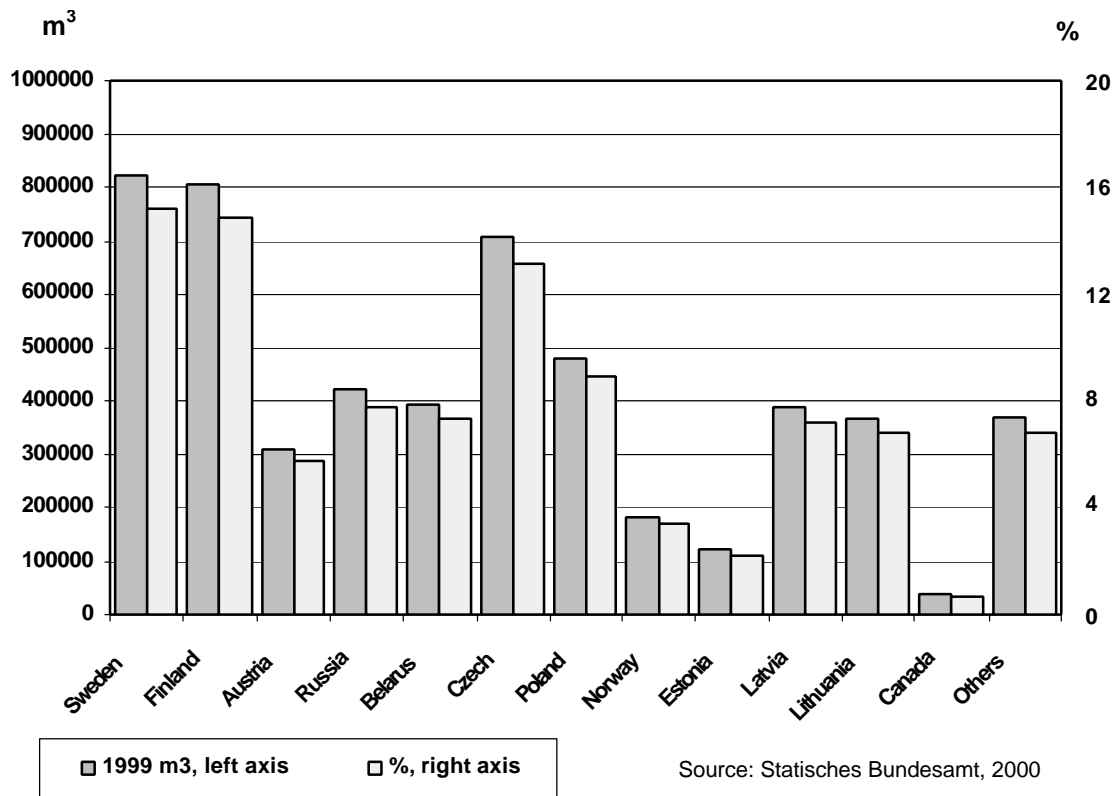
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INTERNET SOURCES

- <http://www.bau-markt.de>
<http://www.baustoffmarkt-online.de>
<http://www.bd-holz.de>
<http://www.diy.de>

APPENDICES

Appendix 1. Sawn wood imports to Germany in 1999.



Appendix 2. Supplementary tables on the sample & results of the study.

ADDITIONAL TABLE 1. SUPPLIER COUNTRIES' CONTRIBUTION OF THE WOOD-PRODUCT-BASED TURNOVER IN THE RESPONDENT COMPANIES.

Proportion of the total wood product turnover in the respondent companies	Germany		Austria		Finland		Sweden		Canada		Others**	
	%	n	%	n	%	n	%	n	%	n	%	n
< 20%	11	8	86	62	95	69	96	70	99	72	78	57
20-40%	22	16	10*	7	5*	4	4	3	1	1	12	9
40-60%	25	18	2	2	0	0	0	0	0	0	10	7
60-80%	22	16	2	2	0	0	0	0	0	0	0	0
> 80%	20	15	0	0	0	0	0	0	0	0	0	0
In total	100	73	100	73	100	73	100	73	100	73	100	73

* Interpretation of the table: For instance, 10% of the respondents obtain 20-40% of their wood products from Austria but only 5% of the respondents are such companies that obtain 20-40% of wood products from Finland.

** Others are most often suppliers from East European countries

ADDITIONAL TABLE 2.SHARE OF WOOD PRODUCT GROUPS FROM THE TOTAL WOOD PRODUCT TURNOVER IN THE RESPONDENT COMPANIES.

Share of the total wood product turnover	Doors, windows and prefabricated products		Kitchen cabinets		Panels and mouldings		Building boards		Flooring materials		Sawn timber		Others**	
	From the percentage and number of respondents													
	%	n	%	n	%	n	%	n	%	n	%	n	%	n
< 10%	51	38	98	73	45	34	44	33	31	23	33	25	78	58
10-20%	31	23	1	1	31	23	40	30	40	30	33	25	12	8
20-30%	12	9	1	1	23	17	7*	5	19	14	13	10	6	5
30-40%	1	1	0	0	1	1	5	4	8	6	10	7	2	2
> 40%	5	4	0	0	0	0	4	3	2	2	11	8	2	2
In total	100	75	100	75	100	75	100	75	100	75	100	75	100	75

**Interpretation of the table: For instance, building boards' share in the wood product turnover is 20-30% at 7% of the respondents.*

*** Others are most often suppliers from East European countries*

ADDITIONAL TABLE 3.CONTRIBUTION OF SALES TO VARIOUS CUSTOMERS GROUPS FROM THE TOTAL TURNOVER IN THE RESPONDENT COMPANIES.

Sales to various customer groups, (%)	Construction firms		Industrial customers		Private consumers	
	Sales to the various customer groups					
	%	n	%	n	%	n
< 20%	71	52	58	43	22	16
20-40%	16	12	16	12	22	16
40-60%	7	5	12	9	8	6
60-80%	5	4	8	6	18	13
> 80%	1	1	6	4	30*	23
In total, all respondents	100	74	100	74	100	74

**Interpretation of the table: For instance, 30% of the respondents sell over 80% of their total sales to private consumers.*

ADDITIONAL TABLE 4.RESULTS OF T-TEST IN COMPARING MAIL SURVEY AND INTERVIEW DATA.

Statistically significant (p < 0.05) differences are shown in the following table.

Variable	Place in the text	Mean, whole data	Mean, mail survey data	Mean, interview data	p-value
Supplier characteristics	Table 7	1.3	1.6	1.2	0.005
Technical quality of concrete products	Table 18	2.1	1.8	2.2	0.048
Supplier characteristics of wood products	Table 24	2.1	2.5	1.9	0.043
Surface treatment of the product is safe	Table 36	1.8	2.3	1.5	0.000
Steel is an individual material	Table 27	3.1	3.5	2.9	0.028
Wood material is stylish	Table 27	1.6	1.4	1.8	0.045
Processing costs of concrete are low	Table 28	2.5	2.7	2.2	0.045
Concrete is ease of care	Table 31	2.5	2.1	2.7	0.027
Steel is easy to process	Table 31	3.2	3.4	3.0	0.031

ADDITIONAL TABLE 5.RESULTS OF THE KRUSKAL-WALLIS – TEST IN DIFFERENT WOOD PRODUCT GROUPS.

Significant differences ($p < 0.1$) between respondent groups are shown in bold. The smaller the sum of rank is, the more important product property for the respondent group is. Please, note that the sums of ranks are not comparable between various wood product groups. Ranks within respondent groups are shown for those product properties for which the order is statistically significantly different in different respondent groups.

For instance, in Table 5.1. can be detected that for wood product wholesalers usability of the windows, doors and prefabricated products is more important product criterion than for construction material retailers and for construction material retailers more important than for DIY chains.

ADDITIONAL TABLE 5.1. WINDOWS, DOORS, PREFABRICATED PRODUCTS.

Product property:	Construction material retailers		Wood product wholesalers		DIY chains		p-value
	Sum of Ranks	Rank*	Sum of Ranks	Rank*	Sum of Ranks	Rank*	
Technical quality	3569		3250		3297		0.8075
Usability	3059	2.	2613	1.	3909	3.	0.0515
Visual properties	2656		3822		3431		0.1893
Price	4119		2917		3209		0.1483
Environmental friendliness	3484		3181		3378		0.8842
Services, information and logistics	3844		3136		3223		0.4776
Supplier characteristics	3250	2.	4192	3.	2927	1.	0.0727

**Numbers in the Rank columns indicate the order between respondent groups.*

ADDITIONAL TABLE 5.2. KITCHEN CABINETS.

Product property:	Construction material retailers		Wood product wholesalers		DIY chains		p-value
	Sum of Ranks	Rank*	Sum of Ranks	Rank*	Sum of Ranks	Rank*	
Technical quality	2117		2240		2215		0.9715
Usability	1778		1755		2544		0.1213
Visual properties	1800		1900		2475		0.2535
Price	2872	3.	2455	2.	1842	1.	0.0769
Environmental friendliness	1639	2.	1450	1.	2723	3.	0.0057
Services, Information and logistics	2756	3.	2580	2.	1833	1.	0.0803
Supplier characteristics	2772	2.	3495	3.	1446	1.	0.0002

**Numbers in the Rank columns indicate the order between respondent groups.*

ADDITIONAL TABLE 5.3. PANELS AND MOULDINGS.

Product property:	Construction material retailers		Wood product wholesalers		DIY chains		p-value
	Sum of Ranks	Rank*	Sum of Ranks	Rank*	Sum of Ranks	Rank*	
Technical quality	4039		3844		3249		0.3382
Usability	3278		3503		3816		0.6424
Visual properties	3367	2.	2758	1.	4153	3.	0.0466
Price	3839		3578		3489		0.8328
Environmental friendliness	3144		4167		3543		0.2798
Services, information and logistics	3694		3711		3494		0.9083
Supplier characteristics	3889		3983		3254		0.3652

*Numbers in the Rank columns indicate the order between respondent groups.

ADDITIONAL TABLE 5.4. BUILDING BOARDS (PLYWOOD, OSB, MDF, PARTICLE BOARD).

Product property:	Construction material retailers		Wood product wholesalers		DIY chains		p-value
	Sum of Ranks	Rank*	Sum of Ranks	Rank*	Sum of Ranks	Rank*	
Technical quality	3747		3666		3694		0.9924
Usability	3114		3879		3899		0.3874
Visual properties	4017		3650		3568		0.7340
Price	3658		3005		4088		0.1642
Environmental friendliness	3253		4340		3586		0.2550
Services, information and logistics	4092		3197		3769		0.4040
Supplier characteristics	3944		4308		3257		0.1773

*Numbers in the Rank columns indicate the order between respondent groups.

ADDITIONAL TABLE 5.5. FLOORING MATERIALS (PARQUET AND LAMINATE).

Product property:	Construction material retailers		Wood product wholesalers		DIY chains		p-value
	Sum of Ranks	Rank*	Sum of Ranks	Rank*	Sum of Ranks	Rank*	
Technical quality	3950	2.	4386	3.	2926	1.	0.0151
Usability	3194		3069		3970		0.2121
Visual properties	3247		2942		4010		0.1359
Price	3832		3333		3524		0.7577
Environmental friendliness	3547		3950		3346		0.5621
Services, information and logistics	3991		2958		3640		0.2839
Supplier characteristics	3394		4253		3264		0.2180

*Numbers in the Rank columns indicate the order between respondent groups.

ADDITIONAL TABLE 5.6. SAWN TIMBER.

	Construction material retailers		Wood product wholesalers		DIY chains		p-value
	Sum of Ranks	Rank*	Sum of Ranks	Rank*	Sum of Ranks	Rank*	
Product property:							
Technical quality	3319		3863		3496		0.6832
Usability	2631	1.	3992	3.	3797	2.	0.0750
Visual properties	3561		3071		3820		0.4292
Price	4086	3.	2766	1.	3709	2.	0.1001
Environmental friendliness	3581		3334		3658		0.8477
Services, information and logistics	3642		3495		3532		0.9727
Supplier characteristics	3978	2.	4145	3.	2974	1.	0.0741

**Numbers in the Rank columns indicate the order between respondent groups.*

ADDITIONAL TABLE 6.SPECIFIC MATERIAL PROPERTIES.

Specific product property	Material			
	Wood	Plastic	Steel	Concrete
	Means			
Material is individual	1.4	2.6	3.1	3.5
Material is warm and attractive	1.2	3.2	4.3	4.4
Material has pleasant visual properties	1.2	2.6	3.4	3.9
Material is stylish	1.6	3.3	3.3	3.8
Material is modern	2.0	2.1	2.3	2.9
Material is old fashioned	3.3	3.3	3.5	3.3
Material is valuable	1.8	3.3	2.9	3.6
Material is youthful	2.4	2.3	2.7	3.2
Package is clean and neat	2.3	2.0	2.9	3.3
General image of the material is high	1.8	2.9	2.7	3.3
Material is easily available	1.7	1.9	2.1	1.9
Supply of the material is stable	2.2	2.7	1.4	1.5
Processing costs of the material are low	2.3	2.5	2.8	2.5
Material is inexpensive	2.5	2.2	2.7	2.3
Price of the material is stable	2.8	2.7	2.7	2.4
Price-quality ratio of the material is good	2.1	2.3	2.4	2.4
Use value of the material is good	2.0	2.2	2.3	2.5
Product information about material is understandable and simple	2.3	2.4	2.6	2.5
Information about the material/products is easily available	2.2	2.4	2.5	2.3
Information about suppliers is easily available	2.5	2.5	2.6	2.5
Information about material is available via the Internet	2.5	2.5	2.7	2.6
Product information (labels) are good and informative	2.4	2.4	2.6	2.5
Material is environmentally friendly	1.4	3.5	2.8	3.1
Material is socially acceptable	1.8	2.8	2.6	2.7
Products have an eco-label	1.9	3.5	3.7	3.6
Material is safe and non-hazardous	1.7	2.9	2.3	2.5
Material is statically strong	2.1	3.4	1.7	1.6
Material is ease of care	2.6	1.8	2.5	2.5
Material is durable	2.4	2.1	1.9	1.7
Material is easy to process	1.7	2.6	3.2	3.2
Quality of the material is stable	2.7	2.1	1.9	2.2
Material is non-flammable	3.2	3.4	1.6	1.4
<i>(1= very good, 2= good, 3= moderate, 4= bad, 5= very bad)</i>				

ADDITIONAL TABLE 7.RESULTS OF T-TESTS IN COMPARING OPINIONS OF SPECIFIC MATERIAL PROPERTIES.

Statistically significant differences ($p < 0.1$) between materials are indicated with a cross. A table with no cross indicates no significant differences in opinions.

	Material is individual			
	Wood	Plastic	Steel	Concrete
Wood		X	X	X
Plastic	X		X	X
Steel	X	X		
Concrete	X	X		

	Material is valuable			
	Wood	Plastic	Steel	Concrete
Wood		X	X	X
Plastic	X		X	
Steel	X	X		X
Concrete	X		X	

	Material is warm and attractive			
	Wood	Plastic	Steel	Concrete
Wood		X	X	X
Plastic	X		X	X
Steel	X	X		
Concrete	X	X		

	Material is youthful			
	Wood	Plastic	Steel	Concrete
Wood				X
Plastic				X
Steel				X
Concrete	X	X	X	

	Material has pleasant visual properties			
	Wood	Plastic	Steel	Concrete
Wood		X	X	X
Plastic	X		X	X
Steel	X	X		X
Concrete	X	X	X	

	Packaging is clean and neat			
	Wood	Plastic	Steel	Concrete
Wood		X	X	X
Plastic	X		X	X
Steel	X	X		X
Concrete	X	X	X	

	Material is stylish			
	Wood	Plastic	Steel	Concrete
Wood		X	X	X
Plastic	X			X
Steel	X			X
Concrete	X	X	X	

	General image of the material is high			
	Wood	Plastic	Steel	Concrete
Wood		X	X	X
Plastic	X			X
Steel	X			X
Concrete	X	X	X	

	Material is modern			
	Wood	Plastic	Steel	Concrete
Wood			X	X
Plastic				X
Steel	X			X
Concrete	X	X	X	

	Material is easily available			
	Wood	Plastic	Steel	Concrete
Wood			X	
Plastic				
Steel	X			
Concrete				

	Material is old fashioned			
	Wood	Plastic	Steel	Concrete
Wood				
Plastic				
Steel				
Concrete				

	Supply of the material is stable			
	Wood	Plastic	Steel	Concrete
Wood		X	X	X
Plastic	X		X	X
Steel	X	X		
Concrete	X	X		

	Processing costs of the material low			
	Wood	Plastic	Steel	Concrete
Wood			X	
Plastic				
Steel	X			
Concrete				

	Material is inexpensive			
	Wood	Plastic	Steel	Concrete
Wood		X		
Plastic	X		X	
Steel		X		X
Concrete			X	

	Price of the material is stable			
	Wood	Plastic	Steel	Concrete
Wood				X
Plastic				
Steel				
Concrete	X			

	Price-quality ratio of the material is good			
	Wood	Plastic	Steel	Concrete
Wood				
Plastic				
Steel				
Concrete				

	Use value of the material is good			
	Wood	Plastic	Steel	Concrete
Wood			X	X
Plastic				
Steel	X			
Concrete	X			

	Product information is understandable and simple			
	Wood	Plastic	Steel	Concrete
Wood				
Plastic				
Steel				
Concrete				

	Information about material / products is easily available			
	Wood	Plastic	Steel	Concrete
Wood				
Plastic				
Steel				
Concrete				

	Information about suppliers is easily available			
	Wood	Plastic	Steel	Concrete
Wood				
Plastic				
Steel				
Concrete				

	Information about material is available via the Internet			
	Wood	Plastic	Steel	Concrete
Wood				
Plastic				
Steel				
Concrete				

	Product information (labels) are good and informative			
	Wood	Plastic	Steel	Concrete
Wood				
Plastic				
Steel				
Concrete				

	Material is environmentally friendly			
	Wood	Plastic	Steel	Concrete
Wood		X	X	X
Plastic	X		X	
Steel	X	X		
Concrete	X			

	Material is socially acceptable			
	Wood	Plastic	Steel	Concrete
Wood		X	X	X
Plastic	X			
Steel	X			
Concrete	X			

	Products have an eco-label			
	Wood	Plastic	Steel	Concrete
Wood		X	X	X
Plastic	X			
Steel	X			
Concrete	X			

	Material is safe and harmless to health			
	Wood	Plastic	Steel	Concrete
Wood		X	X	X
Plastic	X		X	X
Steel	X	X		
Concrete	X	X		

	Material is statically strong			
	Wood	Plastic	Steel	Concrete
Wood		X	X	X
Plastic	X		X	X
Steel	X	X		
Concrete	X	X		

	Material is easy to process			
	Wood	Plastic	Steel	Concrete
Wood		X	X	X
Plastic	X		X	X
Steel	X	X		
Concrete	X	X		

	Material is ease of care			
	Wood	Plastic	Steel	Concrete
Wood		X		
Plastic	X		X	X
Steel		X		
Concrete		X		

	Quality of the material is stable			
	Wood	Plastic	Steel	Concrete
Wood		X	X	X
Plastic	X			
Steel	X			
Concrete	X			

	Material is durable			
	Wood	Plastic	Steel	Concrete
Wood			X	X
Plastic				X
Steel	X			
Concrete	X	X		

	Material is non-flammable			
	Wood	Plastic	Steel	Concrete
Wood			X	X
Plastic			X	X
Steel	X	X		
Concrete	X	X		

ADDITIONAL TABLE 8.RESULTS OF T-TEST IN COMPARING DIFFERENT MEDIA CHANNELS IN THE MARKETING OF WOOD PRODUCTS.

	Mean values	Newspapers	Journals	Technical journals	TV	Exhibitions	Brochures	Internet
		2.7	2.5	2.0	2.6	2.2	2.2	2.5
Newspapers	2.7			X		X	X	
Journals	2.5			X				
Technical journals	2.0	X	X		X			X
TV	2.6			X				
Exhibitions	2.2	X						
Brochures	2.2	X						
Internet	2.5			X				

Appendix 3. Questionnaire

THEME 1: OVERALL PRODUCT PROPERTIES

Question 1: Please, indicate with a cross (x) how important the following characteristics are when you choose products into your company's product palette? (1= very important, 2= important, 3= moderately important, 4= not very important, 5= not at all important)

	Very Important					Not at all Important
	1	2	3	4	5	
A Technical quality (e.g. durability, stable quality)	()	()	()	()	()	
B Usability (e.g. weight, suitability for working etc.)	()	()	()	()	()	
C Visual properties, appearance (e.g. form, design, colour, surface patterns)	()	()	()	()	()	
D Price	()	()	()	()	()	
E Environmental friendliness (e.g. possibility to recycle, origin of the material etc.)	()	()	()	()	()	
F Services, information and logistics (packaging, payment & delivery arrangements etc.)	()	()	()	()	()	
G Supplier characteristics (e.g. sales personnel's attitude and actions, reliability etc.)	()	()	()	()	()	

Question 2: How do you emphasise the following characteristics of wood products when you choose following product groups into your company's product palette? Please rank the characteristics according to their importance (1= the most important criterion, 2= the second important criterion, etc. until 7= the least important criterion)?

	Doors, Windows, prefabricated products	Kitchen cabinets	Panels and mouldings	Building boards: (particle board, MDF, OSB, plywood)	Floorings: (parquet and laminate)	Sawn Timber
A Technical quality	()	()	()	()	()	()
B Usability	()	()	()	()	()	()
C Visual properties, appearance	()	()	()	()	()	()
D Price	()	()	()	()	()	()
E Environmental friendliness	()	()	()	()	()	()
F Services, information and logistics	()	()	()	()	()	()
G Supplier characteristics	()	()	()	()	()	()

Question 3: Please, indicate with a cross (x) how important the following wood product characteristics are for your customers when they buy wood products? (1= very important, 2= important, 3= moderately important, 4= not very important, 5= not at all important)

	Very Important		Not at all Important		
	1	2	3	4	5
A Technical quality	()	()	()	()	()
B Usability	()	()	()	()	()
C Visual properties, appearance	()	()	()	()	()
D Price	()	()	()	()	()
E Environmental friendliness	()	()	()	()	()
F Services, information and logistics	()	()	()	()	()
G Supplier characteristics	()	()	()	()	()

Question 4: Please, rank the following materials on the basis of how good they are regarding these same (above named) product characteristics (1=very good, 2=good, 3=not good not bad, 4=bad, 5=very bad)?

	Wood	Plastic	Steel	Concrete
A Technical quality	()	()	()	()
B Usability	()	()	()	()
C Visual properties,	()	()	()	()
D Price	()	()	()	()
E Environmental friendliness	()	()	()	()
F Services, information and logistics	()	()	()	()
G Supplier characteristics	()	()	()	()

THEME 2: ECOLOGICAL CHARACTERISTICS OF PRODUCTS AND RELATED INFORMATION

Question 5: How would you estimate the share (as % of all your customers) of those customers who pay attention on environmental aspects related with the product?

_____ %

Question 6. Please, indicate (with a cross X) how large share of your customers (according to your estimation) would pay some price premium of environmentally friendly products?

0%() 1-10%() 11-20%() 21-30%() > 30%()

Question 7: For which **wood products** do you think that the customers would pay a green price premium?

Question 8: Please, indicate with a cross (x) **which factors are important for your customers** when they are interested in environmental issues related with products? (1= very important, 2= important, 3= moderately important, 4= not very important, 5= not at all important)

	Very Important				Not at all Important
	1	2	3	4	5
A Wood originates from sustainably managed forests	()	()	()	()	()
B Environmental impacts of the production are small	()	()	()	()	()
C Possibility to recycle the product	()	()	()	()	()
D Recyclable packaging materials	()	()	()	()	()
E Safe (no danger) to health	()	()	()	()	()
F The social aspects are respected (e.g. needs of local people, no child labour etc.)	()	()	()	()	()
G Safe surface treatment	()	()	()	()	()
H Availability of information about the environmental factors and impacts	()	()	()	()	()
I Other, what? _____	()	()	()	()	()

Question 9: Please indicate with a cross (x), how efficient do you find the following ways of informing the consumers/customers about the environmental characteristics of products? (1= very effective, 2= effective, 3= moderately effective, 4= not very effective, 5= not at all effective)

	Very Effective				Not at all Effective
	1	2	3	4	5
A Eco-label attached to the products	()	()	()	()	()
B Product information includes environmental info	()	()	()	()	()
C Certificate of origin	()	()	()	()	()
D Information leaflets with eco-information	()	()	()	()	()
E Campaigns in the press	()	()	()	()	()
F Special campaigns in TV	()	()	()	()	()
G Other, what? _____	()	()	()	()	()

Question 10: Have you ever **heard about PEFC**-forest certification system?

No, not at all () Yes, some () Yes, a lot ()

Question 11: How **interested are your customers about the origin of round wood** used in the wooden products?

Often () Sometimes () Seldom () Never ()

THEME 3: SPECIFIC PRODUCT CHARACTERISTICS OF VARIOUS CONSTRUCTION MATERIALS

Question 12: Please, rank the following four materials according to how good they are with respect to various product characteristics (1=very good, 2=good, 3=moderate, 4=bad, 5=very bad)?

	Wood	Plastic	Steel	Concrete
A Material is individual	()	()	()	()
B Material is warm and attractive	()	()	()	()
C Material is pleasant from its visual properties	()	()	()	()
D Material is stylish	()	()	()	()
E Material is modern	()	()	()	()
F Material is old fashioned	()	()	()	()
G Material is valuable	()	()	()	()
H Material is youthful	()	()	()	()
I Packaging is clean and neat	()	()	()	()
J General image of the material is high	()	()	()	()
K Material is easily available	()	()	()	()
L Supply of the material is stable	()	()	()	()
M Processing costs of the material are low	()	()	()	()
n Material is inexpensive	()	()	()	()
O Price of the material is stable	()	()	()	()
P Price-quality ratio of the material is good	()	()	()	()
Q Use value of the material is good	()	()	()	()
R Product information about material is understandable and simple	()	()	()	()
S Information about the material/products is easily available	()	()	()	()
T Information about suppliers is easily available	()	()	()	()
U Information about material is available via the Internet	()	()	()	()
V Product information (labels, information tags) are good and informative	()	()	()	()
X Material is environmentally friendly	()	()	()	()
Y Material is socially acceptable	()	()	()	()
Z Products have an eco-label	()	()	()	()
Ä Material is safe and harmless for health	()	()	()	()
Ö Material is statically strong	()	()	()	()
A1 Material is ease of care	()	()	()	()
A2 Material is durable	()	()	()	()
A3 Material is easy to process	()	()	()	()
A4 Quality of the material is stable	()	()	()	()
A5 Material is non-flammable	()	()	()	()

Question 13: Please, indicate with a cross (x) how active in marketing (advertising and other marketing communication) the suppliers of products of various materials are? (1=very active, 2= active, 3= moderately active, 4= not very active, 5= not at all active).

	Very Active				Not at all Active
	1	2	3	4	5
A Wood	()	()	()	()	()
B Plastic	()	()	()	()	()
C Steel	()	()	()	()	()
D Concrete	()	()	()	()	()

THEME 4: MARKETING COMMUNICATION RELATED WITH WOOD PRODUCTS

Question 14: Please, indicate with a cross (x) how **active in marketing communication** the wood product **suppliers from different countries are?** (1=very active, 2= active, 3= moderately active, 4= not very active, 5= not at all active).

Suppliers from...	Very Active				Not at all Active
	1	2	3	4	5
A Germany	()	()	()	()	()
B Austria	()	()	()	()	()
C Finland	()	()	()	()	()
D Sweden	()	()	()	()	()
E Canada	()	()	()	()	()
F Other, which?	()	()	()	()	()

Question 15: How satisfied you are with the activity of marketing communication by wood product producers in general?

- A Their activity is on a suitable level ()
- B They should be somewhat more active ()
- C They should be clearly more active ()
- D They could be even less active ()
- E If you expect increased activity, what measures you think that should be taken by the suppliers?

Question 16: Please, indicate with a cross (x), how **good the following media are in marketing** of wood products? (1=very good, 2=good, 3=moderate, 4=not very good, 5=not at all good)?

	Very good			Not at all good	
	1	2	3	4	5
A Newspapers	()	()	()	()	()
B Magazines	()	()	()	()	()
C Professional magazines	()	()	()	()	()
D TV	()	()	()	()	()
E Fairs	()	()	()	()	()
F Information leaflets	()	()	()	()	()
G Internet	()	()	()	()	()
H Other, which?	()	()	()	()	()

Question 17: Please, **rank the wood product suppliers** from various countries based on how good their **marketing communication** is (1=very good, 2=good, 3=moderate, 4=bad, 5=very bad)?

	Germany	Austria	Finland	Sweden	Canada
A Target oriented (clear targets)	()	()	()	()	()
B Reliable	()	()	()	()	()
C Meaningful	()	()	()	()	()
D Interesting	()	()	()	()	()
E Attracts attention	()	()	()	()	()
F Takes environment into consideration	()	()	()	()	()
G Other, what	()	()	()	()	()

Question 18: Which **supplier characteristics** do you emphasise when choosing suppliers of wood products for your own company?

	Very Important				Not at all Important
	1	2	3	4	5
A Payment arrangements	()	()	()	()	()
B Fast delivery schedules	()	()	()	()	()
C The supplier is well-known	()	()	()	()	()
D Country of origin	()	()	()	()	()
E Domesticity of the supplier	()	()	()	()	()
F Price (level and stability)	()	()	()	()	()
G High product quality	()	()	()	()	()
H Wide product palette	()	()	()	()	()
I General customer oriented behaviour – e.g. willingness to deliver customised quality or special dimensions	()	()	()	()	()
J Image and reputation of the supplier	()	()	()	()	()
K Reliability of the supplier	()	()	()	()	()
L Ease of getting contact with the supplier	()	()	()	()	()
M Friendliness of the sales personnel	()	()	()	()	()
N Sales personnel respect customers	()	()	()	()	()
O E-mail connection with the supplier	()	()	()	()	()
P Possibility to communicate and order via the Internet/email	()	()	()	()	()
Q Respect for environment in operations	()	()	()	()	()

Question 19: Please, rank the supplier countries based on the general performance of wood product suppliers with regard to the above mentioned characteristics. (1=very good, 2=good, 3=moderate, 4=bad, 5=very bad)

	Germany	Austria	Finland	Sweden	Canada
A Payment arrangements	()	()	()	()	()
B Fast delivery schedules	()	()	()	()	()
C The supplier is well-known	()	()	()	()	()
D Price (level and stability)	()	()	()	()	()
E High product quality	()	()	()	()	()
F Wide product palette	()	()	()	()	()
G General customer oriented behaviour – e.g. willingness to deliver customised quality or sized products	()	()	()	()	()
H Image and reputation of the supplier	()	()	()	()	()
I Reliability of the supplier	()	()	()	()	()
J Ease of getting contact with the supplier	()	()	()	()	()
K Friendliness of the sales personnel	()	()	()	()	()
L Sales personnel respect customers	()	()	()	()	()
M E-mail connection with the supplier	()	()	()	()	()
N Possibility to communicate and order via the Internet/email	()	()	()	()	()
O Respect for environment in operations	()	()	()	()	()

Question 20: Please, estimate how large share (%) of your company's total **wood products turnover is based on products supplied by producers of the following countries?**

- | | | |
|---|-------------------------|---------|
| A | Germany | (____)% |
| B | Austria | (____)% |
| C | Finland | (____)% |
| D | Sweden | (____)% |
| E | Canada | (____)% |
| F | Other important (which) | (____)% |
| G | All others | (____)% |
| | | 100% |

Question 21: Please, estimate how large proportion of the total wood products turnover do the various product types (%) make up?

- | | | |
|---|---|---------|
| A | Doors, windows and prefabricated components | (____)% |
| B | Kitchen cabinets | (____)% |
| C | Panels and mouldings | (____)% |
| D | Construction panels | (____)% |
| E | Flooring materials (Parquet & Laminate) | (____)% |
| F | Sawn timber | (____)% |
| G | Other, What? | (____)% |
| | | 100 % |

Question 22: Please, name your **main customer groups and theirs share from the total turnover** with an accuracy of 10 % (for instance construction companies, joinery companies, and private consumers).

- | | |
|---|---------|
| A | (____)% |
| B | (____)% |
| C | (____)% |
| D | (____)% |
| | 100% |

Question 23: Please, indicate with a cross (x) **how the share of wood products from the company's total turnover will develop** during the next five years in your own company.

- | | | |
|---|---------------------------------------|--------|
| A | Clearly higher (increase of over 10%) | (____) |
| B | Somewhat higher (+ 2 to 10%) | (____) |
| C | About the present level (-2- + 2%) | (____) |
| D | Somewhat lower (-2 to - 10%) | (____) |
| E | Clearly lower (decrease of over -10%) | (____) |

Question 24: How do you expect the consumption of wood products to develop during the next five years in Germany?

	Clear increase		About on the present level		Clear decrease
A Doors and windows	()	()	()	()	()
B Kitchen cabinets	()	()	()	()	()
C Panels and mouldings	()	()	()	()	()
D Building boards: (particle board, MDF, OSB, plywood)	()	()	()	()	()
E Flooring materials (Parquet, Laminate)	()	()	()	()	()
F Sawn timber	()	()	()	()	()
G Roof trusses	()	()	()	()	()
H Prefabricated products	()	()	()	()	()
I Wooden houses	()	()	()	()	()
J Log houses	()	()	()	()	()
K Impregnated timber	()	()	()	()	()
L Other, what?	()	()	()	()	()

Question 25: By which measures, according to your opinion, could the use of wood as a construction material be increased?

Please, provide the following information as background about your company:

Company name

Name of the respondent

Title

Address of the company

Annual turnover (ca DM)

Of which wood products (ca DM)

THANK YOU VERY MUCH FOR YOUR TIME AND EFFORTS

ALL ANSWERS WILL BE KEPT STRICTLY CONFIDENTIAL AND ANONYM

Appendix 4. Summary in German.

DIE KONKURRENZFÄHIGKEIT DES HOLZES ALS BAUMATERIAL AUF DEM DEUTSCHEN MARKT

EINLEITUNG

Das Ziel dieses Studiums war die Meinungen der Baumaterialverkäufer gegen verschiedenen Produkteigenschaften der verschiedenen Baumaterialien auf dem deutschen Marktgebiet zu beschreiben. Darüberhinaus wurden die Umweltausgaben und zukünftige Marktaussichten in Bezug auf Holzprodukte erforscht.

DATEI UND ANALYSE

Die Sammlung der hauptsächlichen Daten wurde sowohl als persönliche Interviews als auch als eine Postbefragung durchgeführt. Der Umsatz der antwortenden Firmen vertritt ungefähr 75% vom gesamten deutschen Baumaterialhandel. Die Antworten wurden mit Statistica 6.0 statistischem Programm analysiert. In der Analyse wurden Durchschnittswerten, Medianen, Verteilungen, Faktorenanalysen, T-testen und Kruskal -Wallis-testen benützt. Die Befragten wurden in drei Gruppen, nämlich in 1) Baumaterialhändler, 2) Holzgroßhändler und 3) DIY Ketten geteilt.

Bitte beachten Sie, daß der Umsatzanteil der Holzprodukte in beantwortenden Firmen kleiner war, als der Anteil der Holzprodukte im gesamten Baumaterialhandel Deutschlands ist. Das heißt, daß die Holzhändler nicht in Verhältnis zu ihren eigentlichen Wichtigkeit auf dem deutschen Baumaterialmarkt vertreten sind.

RESULTATEN

Deutsche Baumaterialhändler glauben, daß *die Märkte für Holzprodukte sich vermehren können*. Insbesondere haben Parkette, Holzhäuser, vorgefertigte Bauteile, und Bauplatten das stärkste Wachstumspotential (von 2 bis 10 Prozent) in der nächsten fünf Jahren.

Die Ergebnisse zeigen, daß die Bauprodukte deutlich zwei Dimensionen haben, nämlich das physische Produkt und die dazu verbundenen Informationen und Dienstleistungen (einschließlich der Preis). Das Aussehen und die Umweltausgaben werden mit dem physischen Produkt verbunden, während die Produktinformationen mit dem Dienstleistungen verbunden werden.

Die wichtigsten Auswahlkriterien unter den Befragten sind die technische Qualität des Produkts und die Leistungsfähigkeit des Lieferanten: Sowohl das physische Produkt als auch die verbundenen Dienstleistungen sind wichtig. Das allgemeine Image des Holzes ist gut im Vergleich zu anderen Baumaterialien. Aber das Holz hat nirgends eine konkurrenzfähige Vorteile betreffend die zwei wichtigste allgemeine Materialauswahlkriterien, nämlich die technische Qualität und die Leistungsfähigkeit des Lieferanten.

Die beste allgemeine Konkurrenzfähigkeit des Holzes wird deutlich auf seinem Aussehen, Stil und seiner Umweltqualität basiert, wo das Holz besser als andere Baumaterialien durchkommt. Folglich werden die Vorteile des Holzes auf den ästhetischen und grünen Produkteigenschaften basiert: Holz ist angenehm anzuschauen und zu benutzen, es wird als ein wertvolles Material gesehen, das anerkannt in der Gesellschaft ist. Im allgemeinen weicht das Image des Holzes als ein Baumaterial deutlich von dem von Kunststoffen, Stahl und Beton ab. Stahl und Beton ähneln einander sehr viel. Die Nachteile des Holzes werden auf seinen gewissen technischen Eigenschaften basiert und auf seinen Märkten: beide der hohe Preis und die Qualität von Holzprodukte werden als unsicher empfunden.

Wenn die deutschen Baumaterialhändler und Holzhändler Holzprodukte kaufen, sind das Aussehen und die Anwendungseigenschaften entscheidender als im Einkufen anderer Baumaterialien. Andererseits ist die Leistungsfähigkeit des Lieferanten weniger entscheidend. *Für die DIY Ketten sind Dienstleistungen, Information, Logistik und Leistungsfähigkeit des Lieferanten der Holzprodukte entscheidendere Kriterien als für die anderen beantwortenden Gruppen.* Aber die Auswahlkriterien sind sogar sehr verschiedene betreffend verschiedene Holzprodukte: Das Aussehen ist sehr wichtig in der Auswahl von Paneelen und Leisten, Küchenmöbel und Fußbodenbeläge. Anstatt sind die technische Qualität und der Preis die entscheidendsten Kriterien beim Kauf von Schnittholz und Bauplatten.

Die Befragten glauben gewöhnlich daß auch bei ihren eigenen Kunden (größtenteils Privatkunden aber Industrielle Kunden ebenso) der Preis des Produkts (die vom Aussehen und von technischer Qualität gefolgt wird) das wichtigste Auswahlkriterium beim Kauf von Holzprodukten ist. Die Befragten nehmen an, daß ihre eigenen Kunden das Aussehen des Produkts im Auswahl von Holzprodukten sogar mehr betonen, als was sie selbst tun.

Im allgemeinen schätzen die Befragten die *Umweltqualität des Holzes* als gut. Trotz dieses glauben sie, daß nur eine Minderheit ihrer eigenen Kunden Aufmerksamkeit auf die Umweltfreundlichkeit von Holzprodukten schenken, und daß eine sehr kleine Minderheit einen Aufpreis zahlen würde. Nach der Erfahrung der Befragten ist die Umweltqualität am kritischsten für die Verbraucher, wenn sie Fußbodenbeläge, Paneele,

und anderen Innenausbauprodukte kaufen. Zusätzlich interessieren junge, gutausgebildete Familien mit Kindern sich mehr für die Umweltausgaben und die Produktsicherheit; daher würden sie auch wahrscheinlich Umweltfreundlichkeitszuschlag des Produkts bezahlen.

Die Ergebnisse schlagen vor, daß die *Umweltqualität des Produkts aus drei grundlegenden Dimensionen besteht: 1) Auswirkungen auf menschlicher Gesundheit und allgemeinen Wohlstand, 2) Auswirkungen auf Wälder und Natur, und 3) Wiederwendbarkeit des Produkts*. Aus diesen ist die Auswirkung auf menschliche Gesundheit das wichtigste. Aber es scheint momentan, daß die Auswirkungen auf Wälder und Natur, und Wiederwendbarkeit auf dem Informationen über Umweltqualität des Holzproduktes betont werden. Holzproduktlieferanten sollen mehr Nachdruck auf Auswirkungen auf menschliche Gesundheit und Wohlstand in ihrer Umwelt-kommunikation stellen, weil es ist die menschliche Gesundheit, die das wichtigste für die Verbraucher ist.

GESHÄFTLICHE FOLGERUNGEN

Die geschäftliche Folgerungen dieses Studiums schließen, daß das Aussehen, die Anwendungseigenschaften und die Umweltausgaben von besonderer Wichtigkeit auf Produktgruppen sind die die wichtigste Endverwendungszwecken von skandinavischem Schnittholz und andere Holzprodukte, nämlich Möbel und Innenausbauprodukten, sind.

Folglich ist eine Schlußfolgerung zu ziehen daß das skandinavische Holz solche Eigenschaften hat, die den Gebrauch und den Marktanteil des Holzes und Holzverbrauch im allgemeinen auf dem deutschen Baumaterialmarkt vergrößern können. Erkennung dieser potentiellen Zunahme von Holzverbrauch ist auf dem deutschen Märkte eine Frage von Marketing und das Aussehen der Produkte zu entwickeln. Dazu ist eine Frage um technische Qualität zu entwickeln. Entwicklung des Marketing schließt zwei Aspekte mitein: vermehrte Marketingtätigkeit und sorgfältig segmentierten, zugeschnittenen Inhalt von Marketing Kommunikation.

Die allgemeine Tätigkeit beim Marketing wird von der Tatsache betont daß drei aus vier (76%) Befragten mit der Marketingtätigkeit von Holzproduktlieferanten nicht zufrieden sind. Besonders ausländische *Lieferanten sollen ihre Tätigkeit beim Marketing aktivieren, da nur die deutschen Lieferanten als sehr aktiv in ihrer Marketingkommunikation nach den Baumaterialeinzelhändlern und Holzgroßhändlern wahrgenommen werden*. Besonders werden die DIY Firmen mit der Marketingkommunikation von Holzproduktlieferanten nicht befriedigt. Anstatt wird die Holzgroßhändler ziemlich befriedigt.

Der Inhalt von Marketingkommunikation und das Bauen von Warenzeichen, und auch die physische Produktentwicklung sollte ausdrücklich basiert werden auf welche kritische Materialien betreffend Aspekten der verschiedenen Holzproduktgruppen gewußt wird. Jedoch auch die verschiedenen Kundengruppen betonen Produkteigenschaften auf verschiedenen Weisen. Infolgedessen muß die Marketingkommunikation nach Kundengruppen zugeschnitten werden.