The Competitive Position of the Nordic Wood Industry in Germany – Intangible Quality Dimensions

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This study examines the importance of various intangible product quality dimensions as perceived by wood-trading retailer and wholesaler companies in Germany. Using perceived importance and perceived performance, the study first examines the dimensionality of intangible product quality and then compares Nordic wood product suppliers with suppliers from other major supply regions. Data was collected from 76 German companies during 2000–2001. Results indicate that intangible product quality can be described in three dimensions, "Behaviour and Image", "Serviceability and Environment", and "Reliability". Results also show that Nordic suppliers do not have a strong competitive position in Germany in terms of intangible product quality dimensions. Thus, Nordic suppliers could improve their competitive position by enhancing their service, logistics and other dimensions of the intangible product offering.

Keywords wood products, quality, the intangible product component, performance
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1 Introduction

1.1 Background

Global production of sawn wood has decreased markedly during the last twelve years. In 2002, global production was about 389 million m^3, or 23% less than in 1990. This development is partly due to increasing competition between wood and substitute materials but also heavily influenced by the drop in production accompanying the collapse of the Soviet Union. In Europe, however, the development has been opposite the global trend. Production increased by 43 million m^3 (to 131 million m^3) from 1990 to 2002, an increase of 49%. During the same period, the consump-

tion of sawn wood in Europe increased by only about 17%, meaning that exports of sawn wood increased considerably (Faostat 2003).

Overall, the European wood industry faces tightening competition due to a faster growth in supply than consumption, and to growing competition from substitute materials. The supply of various engineered wood products (EWPs) is expected to grow resulting in intensified competition among wood products (e.g. Rämö et al. 2003). Non-wood substitutes also constitute a significant force in the marketplace. For example, plastics have made significant inroads in the window sector (Anderson et al. 2002).

The physical product is a key element in the total offering perceived by customers. However, even though the physical product features and their quality fulfill the basic needs of customers, the related services and their quality, and price, form together the total offering, which is judged by customers (Kotler 2003, p. 407). Improving physical product quality has been a common response to intensified competition within forest industries. When the quality of physical products continuously improves, the quality of the intangible product components, such as service and information, becomes increasingly important as a potential source of superiority (Porter and Millar 1985, Sinclair 1992, Toivonen 1995, Korhonen and Niemelä 2003).

The wood industry in Finland and Sweden is strongly export oriented, with about two thirds of production volumes exported. The main market area is Western Europe, Germany being among the most important target market, constituting approximately 10% of the total exported volume. Nordic countries clearly compete with each other along with domestic German companies and other exporters (e.g. Austria, The Baltic States, Poland and Russia). For wood product suppliers in any of these countries it is helpful to understand their own and competitor performance from the customer perspective. With this information, the suppliers are able to benchmark themselves against the competitors.

1.2 Theoretical Framework

Improving the competitive situation of a company typically requires high or even superior product quality when compared to competitors. Research has indicated that quality can and should be considered in several dimensions (e.g. Garvin 1984 and 1987, Stone-Romero and Stone 1997, Snoj et al. 2004). Thus, it is important for companies to be able to recognize the dimensions creating the overall quality of their products. In addition, it is the customers' perception of product quality that is crucial to company success, not the company's perception (e.g. Shetty 1987, Snoj et al. 2004). Therefore, quality should be measured from the customer perspective (Garvin 1984 and 1987, Qualls and Rosa 1995, Stone-Romero and Stone 1997, Brucks et al. 2000, Matzler et al. 2004).

Accordingly, recent empirical research analyzing wood products has conceptualized quality as multidimensional, both in the case of goods and associated services. Research has also measured quality from the customer perspective or from both customer and producer perspectives (e.g. Sinclair et al. 1993, Hansen and Bush 1996 and 1999, Pakarinen 1999, Weinfurter and Hansen 1999, Toivonen and Hansen 2003).

Multidimensionality infers that product quality incorporates a wide array of company activities beyond the physical product. This is reflected in the concept of total product quality, which includes the physical product and its appearance, services, logistics and even sales personnel behaviour (e.g. Garvin 1984, Hansen and Bush 1996 and 1999). Social responsibility, environmental and health considerations, information and electronic services, and supplier reputation and other competencies should be also considered part of the total product and its quality. For empirical applications of these attributes see, for example, Handfield et al. (1997), Pakarinen (1999), Hultink et al. (1999), Kärnä (2003), Toivonen and Hansen (2003), Anderson and Hansen (2004) and Hansmann et al. (2004).

The measurement of total product quality comprised of multiple dimensions requires a holistic definition of product. Kotler's (2003) well-known definition comprising the core/basic product, the expected product and the augmented product provides a holistic product concept, but lacks

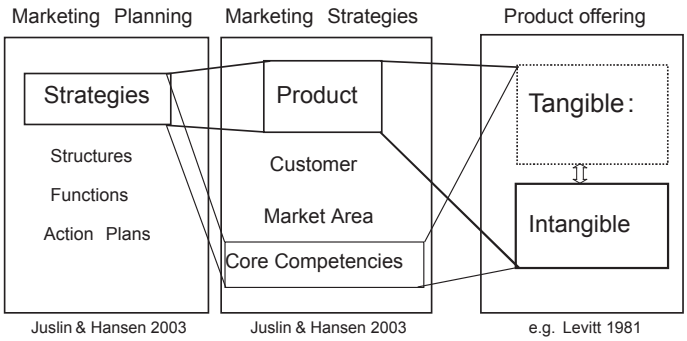

Fig. 1. The theoretical framework of the study: Linkages between marketing planning, marketing strategies and the intangible product dimensions.

a clear distinction between tangible and intangible dimensions. In this paper the total offering (total product) is first classified as comprising tangible and intangible components (Levitt 1981, Snoj et al. 2004). The tangible component comprises the physical (core/basic) product, and such characteristics as packaging and other physical augmentations. The physical product is also determined to comprise environmental characteristics and appearance (Anderson et al. 2002, Toivonen and Hansen 2003).

The intangible product component, as determined here, comprises such product dimensions as service, logistics, information, and supplier behaviour in customer contacts, and supplier characteristics such as reliability. Tangible and intangible product components are interconnected: For example, using environmentally sound raw materials augments the tangible physical product, and reflects respect for the environment among company management. Particularly in the case of wood products, environmental considerations may relate even more clearly to the perceived intangible than tangible product dimensions (Toivonen and Hansen 2003). Therefore, we include environmental considerations in the intangible product characteristics in this study.

The product model applied has its origin in the definition by Toivonen (1995). She followed the ideas of Porter and Millar (1985), who emphasized the role of information and information technology in the total product offering. Thus Toivonen defined a product as comprising physical (tangible), and service and information components (intangible). For example, Luostarinen and Welch (1990), also define a product as consisting of the physical good and related services, technology and know-how, i.e., knowledge and information.

The theoretical framework for this study is presented in Fig. 1. The performance of a supplier in providing intangible product quality is an important factor determining competitive position. Delivering superior quality provides a source of differentiation and even customisation, thus improving competitiveness. Determining appropriate levels of total product quality is an essential decision that every company must make. Quality is determined throughout marketing planning and actions as well as in the production process and should be influenced by customer needs and competitor offerings.

The marketing planning model applied in the background of this paper is described in Juslin (1994) and Juslin and Hansen (2002). Marketing planning is conceptualized as a hierarchical process, where strategic decisions of products, customers, market-area and core competencies set guidelines for marketing functions and structures. Juslin's definition of marketing strategy is fairly extensive and emphasises customer decisions in addition to product decisions. Including core competencies to the strategic decisions underlines such issues as improving product quality through developing services or other intangible resource based capabilities (resource-based approach to marketing/business strategies is presented, e.g., by Mäkinen 1996). This makes the approach

a well-suited background for this study, where we emphasize customer orientation and customer perception of product quality. A comparison of Juslin's marketing strategy concept and other well-known marketing/business strategy concepts is presented by Niemelä (1993). Overall, product is the central element in the market offering. Thus, even though several approaches for determining the marketing / business strategy exist (Luostarinen 1980, Luostarinen and Welch 1990, Juslin 1994, Kotler 2003), all these emphasize the product decision.

However, marketing planning decisions are excluded from the empirical study, which focuses on intangible product quality. Anyhow, the formulation of marketing strategy, including decisions of customers, products, market area and core competencies, dictate the product offering developed by a company. In particular, the product strategy also determines the intangible product and its quality.

1.3 Objectives

The general objective in this paper is to assess the product quality-based competitive position of wood product suppliers from various countries in German markets. We focus on the intangible product dimensions and their quality, which are analyzed from the perspective of the German construction material retailers and wholesalers. In addition, the performance of Finnish and Swedish (hereafter referred to as Nordic) wood product suppliers against suppliers from Germany and Austria is assessed from the perspective of these organisational customers of the wood industry.

Literature suggests that quality dimensions differ in their importance to customers (e.g. Garvin 1987, Brucks et al. 2000). It is also likely that each customer emphasises quality dimensions differently. Therefore, dimensions of quality form the most applicable basis for understanding customer choices (Brucks et al. 2000), and for improving quality. This is the basis for quality being a source of differentiation, which should improve company profitability (Qualls and Rosa 1995). Accordingly, our specific research questions were to determine if:

1) Total product quality includes multiple intangible dimensions;
2) Intangible quality dimensions differ in their importance to customers;
3) Different types of customers (Do-It-Yourself chains/home centres [hereafter referred as DIYs], construction material retailers, wood product wholesalers) emphasise quality dimensions differently.

2 Material and Methods

The empirical aspects of the study are framed by the right-hand box in Fig. 2. Operationalizations were based on earlier studies analysing the image and quality of building materials, particularly wood (e.g. Cohen and Kozak 1996, Hansen and Bush 1996 and 1999, Sinclair et al. 1993, Toivonen 1995, Weinfurter and Hansen 1999), literature analysing environmental considerations related to wood products, and expert suggestions. The questionnaire, and a detailed description of how the operationalizations were derived from earlier literature, is presented in Järvinen et al. (2001). The measured items used in this paper and their relationship to marketing planning are detailed in Fig. 2.

The German market was chosen for empirical research because it is among the most important export markets for the Nordic wood industry, and it is the most important single market for construction materials in Europe. The target groups in this study, i.e., the retail and wholesaler companies trading in wood and other construction materials, are hereafter referred to as customer companies or customers.

The cross-sectional data was collected via standardised personal interviews by two interviewers. The procedure of structuring the questionnaire is described in Järvinen et al. (2001). Measurements of product attribute importance and performance were based on Likert-type 5-step variables assuming equal distances between alternatives and considering the variables as continuous.

Over 2600 companies traded in construction materials in Germany in the year 2000. However, a handful of large companies account for a major share of the market. Several of these companies also operate outside Germany. We attempted a

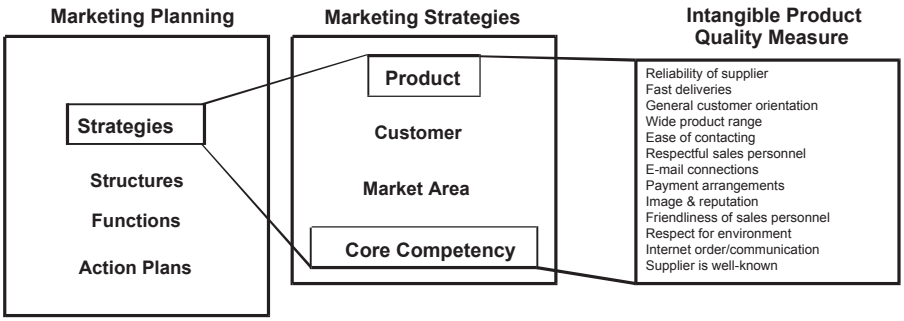

Fig. 2. Operationalization of the theoretical framework of the study (following Juslin and Hansen 2002).

census of the largest 36 companies (available lists of large German DIY companies). For the remainder of the population we selected two of the largest co-operatives (a co-operative of construction material retailers and a co-operative of wood product wholesalers) and created a convenience sample from their membership (companies trading wood products). This created an initial study target group of 95 companies. During the interview process, further companies were identified using Internet and expert interviews, which resulted in 47 potential contacts. Thus a total of 142 retail/wholesale companies/business units were contacted. All target companies/business units [hereafter referred as BUs] received first a letter describing the study, and a notification of a telephone contact to be made later. Then the companies were approached through telephone call in order to ask about their willingness and interest towards the study and to find the person to be interviewed. We targeted the highest person with purchasing authority within each business unit.

We were successful in obtaining 76 responses (48 personal interviews and 28 postal questionnaires) collected between summer 2000 and spring 2001. The annual turnover of respondent companies covers about 75% of the total value of the construction material market in Germany (€38.4 billion in 2000). Respondents were classified into three groups: DIY chains (38 respondents), construction material retailers (18), and wood product wholesalers (20).

Univariate and multivariate statistical methods were used in data analysis, which was conducted using SPSS statistical software. Differences between groups were tested using Anova (with Bonferroni's test for group differences and Tukey's HSD test) and Mann-Whitney's U-test, which is reported. The significance of differences in the average importance of attributes and the average performance of supplier countries was analysed using the t-test. Since the sample is not a completely random sample of all German construction material traders, the statistical tests of difference are used to provide supportive information only. P-values of 0.050 or less are considered as significant. Values between 0.100–0.051 are considered potentially significant, and also reported.

Principal axis factoring with orthogonal Varimax rotation was used to study the dimensionality of the intangible product component. An alpha coefficient was applied in testing the internal consistency of factors, and 0.60 was used as a critical value (following Sinclair et al. 1993). Importance-performance analysis was based on summated scales of importance and performance variables. For each quality dimension, the average perceived performance of suppliers from each country was compared with the importance of each quality dimension.

3 Results

3.1 Quality Dimensions of the Intangible Product Component

The latent dimensions of intangible product quality were evaluated using factor analysis. The

Table 1. Principal axis solution with Varimax rotation of intangible product quality aspects. (Loadings between –0.1 and +0.1 are suppressed, n = 73).

Variable	Factor 1	Factor 2	Factor 3	h^2
Friendliness of sales personnel	0.856	0.226		0.789
Respectful sales personnel	0.701		0.300	0.586
Image & reputation	0.542	0.236	0.102	0.359
Internet order/communication	0.128	0.703	0.111	0.526
Wide product range		0.573	0.249	0.395
Respect for environment	0.282	0.565		0.402
Ease of contacting	0.411	0.492	0.193	0.448
Payment arrangements		0.455	0.210	0.252
Reliability of supplier		0.317	0.667	0.551
Fast deliveries	0.192	0.113	0.573	0.378
General customer orientation	0.303	0.182	0.368	0.261
Eigenvalue	1.92	1.85	1.17	
% of total variation (total 45%)	17.5	16.8	10.7	
Alpha coefficient	0.7475	0.7293	0.6038	
	3 items	5 items	3 items	

Factor 1: The highest loadings are on the general image of the supplier company and the behaviour of sales personnel. Thus the factor reflects human behaviour and the general image of the supplier company. It is notable that ease of contacting also receives some loading on this dimension. The dimension is named "*Behaviour and image*".

Factor 2: High loadings are on attributes other than those that directly describe product related service, and on environmental considerations. These aspects indicate the ability to provide service in general. This dimension is named "*Serviceability and environment*".

Factor 3: The highest loadings are on speed of delivery, which is directly a product-related service, and on reliability. In addition, general customer orientation also receives some loading on this dimension. General customer orientation was explained as willingness to supply special/customised lengths and dimensions, and thus reflects product-related service. It is notable that supplier reliability is linked most clearly with product-related service, and particularly with delivery speed. Thus this factor is named "*Reliability*".

attribute describing how well-known suppliers are was excluded, since it was considered to fit only when analysing early customer relationships. In addition, the variable describing e-mail connections was excluded since it was considered to reflect similar aspects to Internet ordering/communication, but less concretely. Omitting it reduced the size of the variable set to 11, and thus improved the reliability of the factor analysis.

The best interpretable and statistically acceptable result was a three factor solution with a 45% degree of explained variation (Table 1). The resulting factors had sufficiently high internal consistency (alpha value 0.6 or higher). For Factor 3, including customer orientation into the scale slightly improved alpha value. Some of the variables loaded on two factors. In interpreting the factors and testing the scale consistency these variables were, however, only included in the factor where the loading was highest.

Our results are fairly consistent with earlier research. The Reliability and the Serviceability and environment dimensions have clear similarities with the "Serviceability" dimension defined by Brucks et al. (2000), and with the "Supplier Services" dimension observed by Hansen and Bush (1999). However, this study suggests that services and supplier reliability form two quality dimensions instead of one. The "Behaviour and Image" dimension has similarities with the "Supplier Characteristics" dimension observed by Hansen and Bush (1999), and with the "Serviceability" and "Prestige" dimensions defined by Brucks et al. (2000). This study indicates that environmental considerations may also be related to the intangible product component.

Table 2. Importance of the resulting dimensions of the intangible product component, and average performance of the suppliers as perceived by German customers.

Quality dimensions (importance, 1 = very important, 5 = not at all important)	Average performance ranking of wood product suppliers from four countries (perceived performance, 1 = performs very well, 5 = performs very poorly)				
	Importance mean/median range	Performance (mean/median) German	Austrian	Finnish	Swedish
Reliability F3	1.5/1.3 r(1–2.3)	2.1/2.0	2.3/2.3	2.7/2.7	2.8/2.7
Behaviour and image F1	2.1/2.0 r(1–5)	2.2/2.3	2.3/2.3	2.4/2.3	2.4/2.3
Serviceability and environment F2	2.2/2.2 r(1–3.6)	2.3/2.2	2.5/2.4	2.7/2.6	2.7/2.6

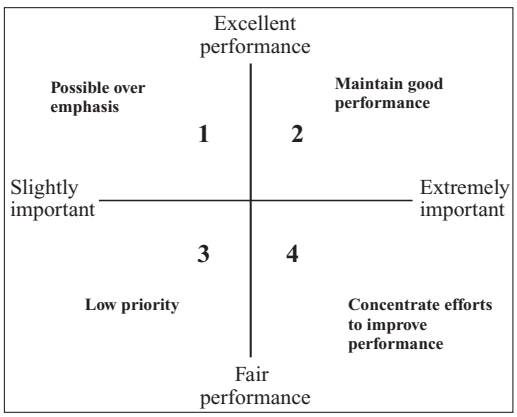

Fig. 3. Importance-performance grid (following Weinfurter and Hansen 1999).

3.2 Competitive Position of Supplier Countries

The performance of suppliers in providing a quality product can be analysed within a four-cell framework (Fig. 3). This framework was used in a study of softwood lumber quality by Weinfurter and Hansen (1999). They borrowed the concept from Martilla and James (1977), and the concept has been also used in several earlier studies (see e.g. Matzler et al. 2004). The four quadrants are:

1) Suppliers concentrate efforts on quality aspects that customers find only moderately important;
2) Quality aspects are clearly important for customers, and suppliers are already performing well;
3) These quality aspects are relatively unimportant to customers and should receive little attention from suppliers;
4) Quality aspects are important to customers, but suppliers perform only modestly and should concentrate on improving performance.

The above analysis has been criticized as too simple for making strict conclusions about resource allocation in order to strengthen company competitiveness. For example Matzler et al. (2004) argue that potential dependency between quality dimensions importance and performance should be measured first. However, the framework is suitable for comparing the competitive position of suppliers and is a useful diagnostic tool for individual companies to assess their situation.

The importance of the three intangible product dimensions described above was assessed using the average importance of the attributes included. The average performance of suppliers from various countries was calculated similarly (Table 2).

For German customers, "Reliability" is the most important of the intangible product dimensions analysed in this study. This dimension is significantly more important than the two other dimensions (t-test $p = 0.000$ in both comparisons). The dimensions "Behaviour and Image", and "Serviceability and Environment" are both

fairly important, and the difference in the importance of these two dimensions is not statistically significant.

German suppliers have a fairly strong competitive position in domestic markets, as shown in Table 2. Nordic suppliers are perceived as performing between moderate and good regarding each dimension. Despite this, the performance of Nordic suppliers is generally perceived more modest than that of German or Austrian suppliers. The difference in perceived performance between Nordic and German suppliers, or between Nordic and Austrian suppliers is largest regarding "Reliability" (Table 2), which is the most important of the quality dimensions observed.

The differences in performance between Germany and all three other countries were statistically significant or potentially significant regarding all three dimensions (t-test, p-value in paired comparisons of average performance varied between 0.000–0.068). Austrian suppliers also perform significantly better than Nordic suppliers regarding "Reliability" and "Serviceability and Environment" (t-test, p-value in paired comparisons varying between 0.000–0.023). There was no statistically significant difference between average performance of Swedish and Finnish suppliers regarding any of the three dimensions according to the t-test.

The performance of suppliers in relation to the importance of product dimensions can be shown using the previously mentioned importance-performance grid. Each axis would cross the other in point three. On this grid, each of the three intangi-

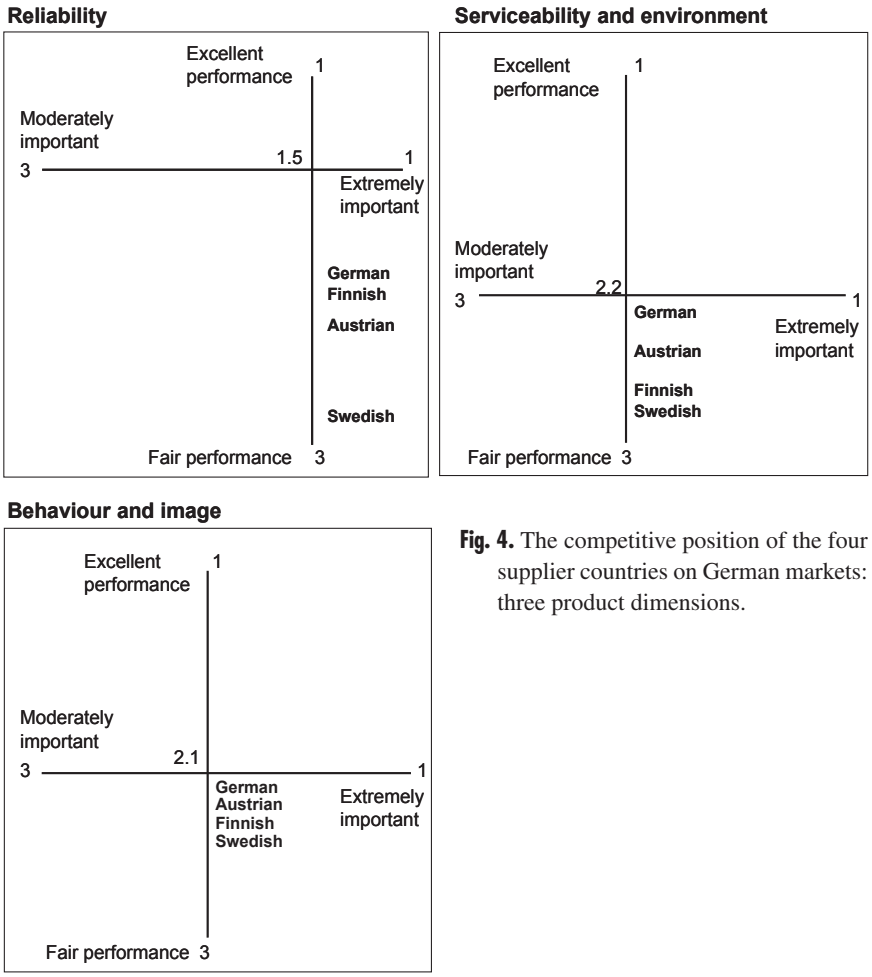

Fig. 4. The competitive position of the four supplier countries on German markets: three product dimensions.

ble product quality dimensions is located between moderate (3) and high (1) importance. Thus each country would be positioned in quartile number two classified as "Maintain good performance". Instead, in order to better clarify the differences among the four countries, the competitive positions are shown within quartile number two (Fig. 3). In this figure, the importance and performance scales cross each other in the mean point of the importance scale for each dimension.

Fig. 4 shows that suppliers from all four countries have, on average, some gap between their performance and the importance of each of the intangible product dimensions analysed. The difference between importance and performance is particularly clear in the case of "Reliability". However, regarding "Behaviour and Image", the performance of suppliers from all four countries is fairly close to the importance of this dimension. Particularly for German suppliers, the performance is also fairly close to the importance ranking regarding "Serviceability and Environment".

The potential differences in average perceptions of the three customer company groups were tested, and the Mann-Whitney U-test results are reported here. Perceptions of both importance of the three dimensions, and the performance of various supplier countries with regard to these dimensions were investigated. In general, there were few significant differences in the perceptions of the three company groups, and the differences observed exist between wood product wholesalers and the two other groups. No clear differences were observed between DIY companies and construction material retailers regarding their perceptions about intangible product dimensions.

Construction material retailers find "Serviceability and Environment" more important than wood product wholesalers ($p=0.017$). Construction material retailers also have a better perception about Swedish suppliers regarding "Behaviour and Image" than wood product wholesalers do ($p=0.098$) do ($p=0.082$). DIY companies ($p=0.021$) and construction material retailers ($p=0.095$) consider Finnish suppliers to perform better on "Reliability" than wood product wholesalers do. Wood product wholesalers find German suppliers even more reliable than construction material retailers ($p=0.095$) and DIY companies.

4 Discussion

This paper focuses on the dimensionality of intangible wood products quality and the competitive position of German, Austrian, Swedish and Finnish wood product suppliers in German markets. In general, the results were in accordance with the assumption of quality being a multidimensional concept. Three dimensions of intangible product quality were discovered: "Reliability", "Serviceability and Environment", and "Behaviour and Image". These dimensions had clear similarities with the quality dimensions determined in earlier studies but were not totally uniform with any of these (Garvin 1984, Hansen and Bush 1996 and 1999, Pakarinen 1999, Brucks et al. 2000). In particular, this study indicates that services may form two rather than one dimension, and suggests that environmental considerations may be related not only to tangible, but also to the intangible product component at least in the case of wood products.

The observed quality dimensions varied somewhat in their importance to customers, as was assumed based on literature. Reliability of the supplier, including product-related service and timely deliveries, is the most important intangible quality dimension for German traders of construction materials. Some differences were observed among the DIY chains, construction material retailers and wood product wholesalers regarding their perceptions about product dimensions. This was in accordance with the hypothesis of different customer groups emphasizing product dimensions differently. However, these differences were not particularly clear regarding the importance of the dimensions. In future research, it would be important to emphasise measurement of importance and testing for dependency between perceived performance and importance of quality dimensions.

For the Nordic wood industry this study has an important message: From the customer perspective, differences among supplier countries clearly exist with respect to intangible product quality. Customers also perceived that the average performance of Nordic suppliers is behind that of German or Austrian suppliers. Overall, comparisons of importance of and performance on

intangible quality dimensions indicate that suppliers from any country could still improve their competitive position through improved reliability. However, this is more true for Nordic suppliers than German or Austrian suppliers. Overall, Nordic suppliers should concentrate efforts in improving services and other intangible product quality dimensions in order to improve their competitiveness in the German marketplace. In here, qualitative in-depth-analysis of factors causing different levels of perceived quality would be helpful, particularly regarding Reliability and Serviceability and Environment dimensions where perceived differences between countries are the clearest.

In future it would be useful to apply the importance-performance analysis to markets of clearly specified wood products, such as furniture or sawn wood. This would make it possible to analyse in detail the disparities in quality perceptions between producers and customers. This would also help to avoid a potential bias caused by customers comparing suppliers from different countries with possibly differing product ranges.

The results of factor analysis indicate that the dimensionality of intangible product quality may be more complex than observed in this study (only 45% of variation is explained), and analysing this would require additional attributes. Overall, further research elaborating a potential uniform product quality typology, and its measurement instruments are still needed. It would be important to test the typology with data about various kinds of products including services and in various markets.

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