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Perceptions of wooden interior product quality – insights on sustainability views among Finnish consumers

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Highlights

- The quality indicators of wooden interior products can be grouped into four factors relating to products' environmental friendliness, fit with lifestyle and home design, visual and tactile attractiveness, and technical solidity, which are in multiple ways connected with sustainability.
- The sociodemographic background of the respondents was found to be linked with consumer scores for those factors.
- Wooden interior products should be designed to meet different types of product quality expectations in the home environment.

Abstract

Evaluation of product attributes and the overall quality significantly affect consumer purchasing decisions. Previous studies on wooden products have mostly addressed wood product quality from technical viewpoints, while largely disregarding environmental, social, and economic aspects in the assessments. Therefore, knowledge on how sustainability aspects are evaluated as a feature of wood product quality is narrow. This study investigated consumer perceptions of different quality indicators (i.e., quality cues and attributes) of wooden interior products with a special focus on sustainability and value chain phases. In addition, the connections between consumers' sociodemographic background and their perceptions of the quality features of wooden interior products were evaluated. The material of the study was based on data gathered in 2018 with a postal survey sent to 1000 people living in Finland with a response rate of 25.6%. As methods of analysis, exploratory factor analysis, the Mann-Whitney U test, and the Kruskall-Wallis test were utilized. The results show that the quality indicators of wooden interior products can be grouped into four factors relating to products' environmental friendliness, fit with lifestyle and home design, visual and tactile attractiveness, and technical solidity, which are in multiple ways connected with sustainability. The sociodemographic background of the respondents was found to be linked with consumer scores for those factors. Engaging consumers in sustainable consumption choices requires providing them with information on wooden product value chains that meets their individual needs in relation to their existing knowledge of those issues and individual values.

Keywords consumer behavior; perceived quality; sociodemographic variables; sustainable consumption; wood products
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1 Introduction

The importance of sustainability in defining the quality features of wood products has increased among consumers in recent decades (Toppinen et al. 2013; Holopainen et al. 2014). Especially in the context of housing, sustainability is a multidimensional concept comprising the environmental, social, and economic aspects of consumer expectations for wood product quality (Viholainen et al. 2021). For example, carbon storage properties (Lippke et al. 2011), amenity impacts in living environments (Rhee 2018), and compatibility with perceptions of aesthetics (Lähtinen et al. 2021) connect to the environmental and social sustainability aspects of wood products. In addition, longevity in use (Luo et al. 2018) is linked with both technical durability and the potential to reduce economic costs through longer product life cycles (Petersen and Solberg 2004).

In the context of wood product purchasing choices, preferences for environmental, social, or economic sustainability are not usually separate from each other, but are instead intertwined with each other among consumers to differing extents (Toppinen et al. 2013). In addition, depending on the intended use of the product (i.e., visible surfaces or non-visible purposes), the purchasing preferences of the consumers may vary, for example, due to differing expectations for longevity or aesthetics. The focus of this study is on wooden interior products (e.g., furniture, small home ornaments), which do not have similar technical requirements to wood products used in load-bearing structures (e.g., strength grading). In addition, since visual and tactile properties are also important aspects of wooden interior products (Strobel et al. 2017), these products provide an interesting starting point to evaluate how consumers perceive sustainability in relation to different attributes.

According to previous studies, consumers consider wood products to be environmentally sustainable (Hakala et al. 2015; Strobel et al. 2017; Moresová et al. 2019; Kylkilahti et al. 2020; Viholainen et al. 2020), and they also appreciate the environmental benefits of wood products (Choi et al. 2011; Costa et al. 2011; Cai and Aguilar 2013, 2014; Andac Guzel 2020; Khojasteh-Khosro et al. 2020). In contrast to unambiguously positive views on the environmental sustainability of wood products as such, consumers still have doubts about how forest management practices and logging affect natural ecosystems (e.g., deforestation and negative impacts on wildlife habitats) (Häyrinen et al. 2020; Viholainen et al. 2021). From the perspective of forest management practices, impacts on ecosystems is a topical issue (Holm 2015).

According to the results of Hansmann et al. (2006), consumers with expectations concerning the environmental and social sustainability of forestry are also more likely to buy wooden products with sustainability labels. However, while sustainability expectations for forest management practices are intertwined between environmental and social aspects, in the case of wood products (e.g., in the context of wooden buildings) social sustainability commonly also comprises a dimension of its own. For example, it may be related to perceived health and well-being impacts either in buildings (Lähtinen et al. 2019; Viholainen et al. 2020) or more comprehensively in connection with living environments (Lähtinen et al. 2021, 2022).

The evaluation of different product attributes and the role of quality perceptions in consumers' purchasing choices have been studied in many fields of research; earlier findings suggest, for example, that perceived quality has a significant effect on aspects such as consumers' preferences (Steenkamp 1986), perceived value (Sweeney et al. 1999), and consumers' choices (Grebitus et al. 2011). However, only a few studies in the existing wood product literature have investigated consumers' perceptions of wood product quality, and the studies lack theoretical underpinnings from marketing and consumer behavior research in terms of perceived quality (Harju 2021).

In the previous studies on wood products, quality indicators have been addressed mostly through product or supplier properties (Sinclair et al. 1993; Hansen and Bush 1996, 1999), while sustainability as a feature of quality that affects purchasing choices has largely been neglected.

As exceptions, in the studies of Costa et al. (2011) and Toivonen (2012), environmental aspects have also been addressed in the context of perceived wood product quality. Furthermore, Costa et al. (2011) included social aspects through the perceived safety of wooden windows. However, if addressing studies previously carried out in the context of wood product quality, information on the connections between different sustainability aspects and wood product quality is still very limited. Thus, regarding responsible purchasing behavior and consumer communication, there is a lack of information on how consumers could be engaged in more sustainable material choices, especially in the context of wood products (Lähtinen et al. 2017; Kylkilahti et al. 2020).

Not only there is a lack of information on sustainability as a quality feature of wood products, the current understanding on the role of personal variables (e.g., consumer characteristics) is also scarce. Previously, studies on wood products have investigated the effects of different consumer characteristics on consumer behavior in general (Luo et al. 2017, 2018; Loučanová and Olšiaková 2020; Oblak et al. 2020). For example, it has been found that sociodemographic factors like age (Holopainen et al. 2014; Høibø et al. 2015; Osburg et al. 2016a), gender (Luo et al. 2017, 2018; Aguilar et al. 2021), education (Kaputa et al. 2018), forest ownership (Ranacher et al. 2017), and connections with the forest sector (e.g., education profession) (Aguilar et al. 2021) may affect consumer perceptions of wood products. However, only Costa et al. (2011) have acknowledged the effects of individual characteristics in the wood product quality perception process.

To fill the void in the existing knowledge, this study provides information on how sustainability in the case of wooden interior products connects to consumer perceptions of quality assessed with various indicators. The material of the study is based on survey data, which are analyzed quantitatively with multivariate methods. The first aim of the study is to evaluate how the environmental, social, and economic sustainability of forestry-wood value chains contribute to the perceived quality of wooden interior products through different quality indicators. The second aim is to investigate the interlinkages between consumers' sociodemographic background and their perceptions of wooden interior product quality.

2 Empirical background on perceived product quality and sustainability

Perceived quality has been defined as a customer's subjective judgment regarding overall product superiority that differs from objective quality (Zeithaml 1988). Steenkamp (1989) stated that the perceived quality approach differs from other product quality approaches because it refers to quality neither as absolute nor as objective. He defined perceived quality as the consumer's subjective assessment of the product attributes that depends on the consumer's perceptions, needs, and goals. In addition, Mitra and Golder (2006) defined perceived quality as the "perception of the customer" as opposed to the "objective" quality of the product. The recent definition by Stylidis et al. (2020) approaches perceived quality as a complex, multidimensional entity, where a human is seen as the main agent.

The concept of quality indicators, which include quality cues and attributes, is a critical element in discussing perceived quality (Oude Ophuis and Van Trijp 1995). Olson and Jacoby (1972) stated that quality perceptions prior to purchase are based on quality cues, such as intrinsic and extrinsic cues. Intrinsic cues are those which are physically part of the product, such as technical and visual properties, while extrinsic cues, such as product information and certificates, are connected to the product but not part of it (Olson and Jacoby 1972). Steenkamp (1989) contributed to the research on perceived quality by developing a Model of the Quality Perception Process that combines both quality cues (intrinsic and extrinsic cues) and quality attributes (experience and credence attributes). In that model, the quality cues are used to predict the quality attributes that

Table 1. Examples of sustainability attributes in the existing literature.

Sustainability attributes	Examples and sources
Environmental sustainability attributes	Preserving natural ecosystems and biodiversity, and management of production processes to reduce amount of waste, usage of energy, and carbon dioxide emissions (Lähtinen et al. 2016a; Bangsa and Schlegelmilch 2020).
Social sustainability attributes	Health, welfare, and social justice issues connected to impacts on workers and suppliers, consumers, and communities at different phases of value chains (i.e., raw material extraction, primary and secondary production, and use of final product) (Elkington 1997; Lähtinen et al. 2016b; Catlin et al. 2017).
Economic sustainability attributes	Financial performance (e.g., cost reductions and value creation), and "economic interests of external stakeholders (e.g., improvements in economic well-being and standard of living)" (Sheth et al. 2011; Lähtinen et al. 2016b).

cannot be observed prior to consumption. Experience attributes, such as functional properties, can be ascertained on the basis of actual experience with the product, while credence attributes, such as environmental friendliness and origin of the product, cannot be ascertained even after normal use for a long time and/or without consulting an expert (Steenkamp 1989).

Alongside quality cues and attributes, Steenkamp (1989) suggested that the quality perception process is affected by personal and situational variables such as purchasing place. In addition, Brucks et al. (2000) argued that the importance of different quality dimensions may vary for different consumers. Therefore, consumers' characteristics, for example their sociodemographic background, can be seen to affect the product quality perception process. Based on the reviewed literature, perceived quality is a multidimensional construct affected by different cues and attributes related to the product, the consumer's characteristics, and situational variables in the purchasing environment.

Sustainability of products and sustainability attributes have been a focal topic within the research on sustainable consumption (Trudel 2019), which can be seen to be linked with social, environmental, and economic aspects (Elkington 2004) (see Table 1). Even though environmental and social sustainability aspects capture what consumers associate most strongly with sustainability attributes (Catlin et al. 2017), economic sustainability attributes also influence consumer decision-making (Choi and Ng 2011; Balderjahn et al. 2018). In consumer communication, sustainability may be expressed (Bangsa and Schlegelmilch 2020), for example, through labels (e.g., FSC and PEFC labels) (Hansmann et al. 2006; Shoji et al. 2014; Holopainen et al. 2017), narrative claims, such as "environmentally friendly" or "sustainable" (Andac Guzel 2020; Higgins et al. 2020), and physical appearance, such as biodegradable packaging (Steenis et al. 2018). This study investigates the quality indicators of wooden interior materials in reference to environmental, social, and economic sustainability aspects as quality cues and attributes.

3 Analytical framework to assess wood product quality indicators

Most of the earlier wood industry studies have approached quality from the perspective of manufacturing (Garvin 1984a) and only a couple of them have investigated the perceived quality of wood (Costa et al. 2011; Toivonen 2012). Studies carried out in the 1990s focused mostly on quality indicators related to the product or supplier (Sinclair et al. 1993; Hansen and Bush 1996, 1999) and did not acknowledge the environmental aspects of wood as quality attributes. For example, when assessing industrial forest product quality in the context of office furniture, Sinclair et al. (1993) tested Garvin's (1984b) eight quality dimensions: performance, features, reliability, conformance,

durability, serviceability, aesthetics, and perceived quality. However, the results of Sinclair et al. (1993) did not provide support for the eight-dimensional structure of quality.

Furthermore, consumer perceptions of softwood lumber quality were examined in a couple of studies (Hansen and Bush 1996, 1999). Hansen and Bush (1996) combined the models by Garvin (1984b) and Parasuraman et al. (1988), who extended the thinking of Garvin by considering services as factors for quality. According to Parasuraman et al. (1988), there are five dimensions of service quality: service reliability, responsiveness, assurances, empathy, and tangibles. Hansen and Bush (1996) assumed that quality can be generalized across products and the dimensions of quality are the same for all (Zeithaml 1988), but modified the dimensions in several ways to make them more applicable to softwood lumber. In their results, quality characteristics were divided into five dimensions: supplier/salesperson characteristics, supplier facilities, supplier services, lumber performance, and lumber characteristics. In their subsequent work, Hansen and Bush (1999) developed a condensed measurement model for softwood lumber quality. Although Sinclair et al. (1993) and Hansen and Bush (1996, 1999) all emphasized the need to understand quality as perceived by the customer, these studies did not focus on consumers, but rather on the businesses involved in the supply of wood products.

Demand for sustainable forest-based production and products emerged especially in the early 2000s (Lähtinen et al. 2016b). In line with this, research also dedicated greater attention to connecting the views on wood product quality and sustainability. Employing the perceived quality approach, the studies of Costa et al. (2011) on wooden windows and Toivonen (2012) on wooden floors, panels, and furniture considered the environmental aspects of wood as quality attributes. Alongside the consideration of environmental views, Costa et al. (2011) included social aspects through perceived safety as a quality attribute and also acknowledged the role of consumer characteristics in the perceptions of wood product quality. They studied the influence of individual characteristics and information on the product quality perception of different wood product attributes, such as global quality, thermal insulation, acoustic insulation, maintenance, product life, aesthetics, environment, fire resistance, safety, and price, and their results showed that socioeconomic factors among certain product attributes affected the choice of window material.

Toivonen (2012) continued investigating perceived quality in the case of wooden products and suggested that perceived product quality should be understood as a hierarchical structure consisting of tangible and intangible dimensions. She assumed that the "total product" comprises two dimensions: a tangible one (the physical good) and an intangible one (services and other intangibles). The tangible dimension included different subdimensions, such as technical characteristics and appearance, while the intangible subdimensions were related to the supplier, service, information, and environment. However, she did not examine how consumer-related variables, such as sociodemographic factors, affect the perceived product quality.

There is evidence that social sustainability is linked with the use of wood products in interiors (Rice et al. 2006; Spetic et al. 2007; Gold and Rubik 2009; Nyrud and Bringlinsmark 2010), emphasizing the need to address wood product quality broadly on the basis of multiple sustainability aspects. In addition, alongside general sociodemographic factors such as gender and age, connections to forest ownership and involvement with the forest sector have also been found to affect consumer perceptions of wood products and forest industry businesses more generally (Luo et al. 2017, 2018; Ranacher et al. 2017; Aguilar et al. 2021).

By considering sustainability as a multidimensional entity comprising environmental, social, and economic aspects, which are also linked with technical issues, this study brings new insights on the existing knowledge on consumer studies in the context of wooden interior products. In previous studies on perceived wood product quality, consideration of sustainability has mainly regarded environmental aspects (Costa et al. 2011; Toivonen et al. 2012), while largely neglecting views

Fig. 1. Analytical framework of the study to assess consumer perceptions of wooden interior product quality as a combination of quality cues and attributes and their connections with consumers' sociodemographic background (mod. from the Model of the Quality Perception Process of Steenkamp 1989).

on social and economic sustainability as well as their linkages with technical durability. Fig. 1 illustrates the analytical framework of the study and presents how wooden interior product quality is in this study addressed as a construct, which comprises the perceptions of consumers on the quality indicators (e.g., quality cues and attributes) and connections with their sociodemographic background. The analytical framework has been formulated based on the Model of the Quality Perception Process (Steenkamp 1989).

4 Material and methods

4.1 Survey design and data gathering

The material of the study was gathered in two rounds in 2018 (first contact in late June, reminder for non-respondents in late July) with a questionnaire sent to 1000 people aged 18–74 living in Finland. The recipients of the questionnaire were selected from the Population Register Centre in Finland with a simple random sampling from the official Population Information System database. Since the database only includes postal addresses for residents in Finland, all materials (i.e., cover letter, questionnaire) were sent to the recipients in paper versions.

In the first round of material gathering, the questionnaire could only be returned by postal mail in order to facilitate tracking (i.e., number code placed in the returning envelope) of those who had already participated in the survey. The second round of data gathering and the reminder letter were targeted at non-respondents, who were given an opportunity to choose between a paper or electronic version of the questionnaire. For using the electronic questionnaire, both a URL link and QR Code were given in the reminder letter. As a result of the two-round material gathering, altogether 256 respondents filled out the questionnaire (response rate 25.6%); 158 of the questionnaires were returned in the first round of material gathering, and 100 (76 paper versions, 24 electronic versions) after the reminder letter was sent in the second round of data gathering. Two of the returned questionnaires were not filled and thus were removed from the final dataset. According to Kaplowitz et al. (2004), the response rate can be considered to be typical of mail and online surveys.

The questionnaire comprised many types of questions on wood products (for earlier results, see Lähtinen et al. 2019). This study employed questions connected to purchases of wooden interior products and information on the sociodemographic background of the respondents (i.e., gender, age, education, municipality of residence, forest sector involvement, forest ownership). Operationalization of the quality indicators to be assessed by the respondents as variables affecting their purchasing choices was based on a literature review of peer-reviewed journal articles connected to different aspects of wood product quality, marketing, and/or end users (Table 2). This approach made it possible to address quality as a diversified and multidimensional concept, which also comprises human perceptions of product attractiveness, instead of focusing purely on technical quality (e.g., sawnwood measured with established criteria and definition of defects such as knots, splits, twists, and wanes).

Table 2. Peer-reviewed journal articles used to operationalize the quality indicators of wooden interior products in the questionnaire.

Quality indicators	Wood product quality studies	Other wood product studies indirectly connected with quality
Wood species used in the product, e.g., oak, birch	--	Donovan et al. 2004; Nicholls et al. 2004; Brinberg et al. 2007; Bumgardner et al. 2007; Nicholls and Bumgardner 2007; Scholz and Decker 2007; Arowosoge and Tee 2010
Product is made of solid wood, e.g., furniture made of solid wood	--	Jonsson et al. 2008; Lindberg et al. 2013
Visual properties, e.g., surface patterns	Aesthetics (Sinclair et al. 1993); overall lumber appearance, lumber straightness (Hansen and Bush 1996, 1999); aesthetics (Costa et al. 2011); appearance/visuality (Toivonen 2012)	Knots (Broman et al. 2001); character marks (Bumgardner et al. 2009); grain (Arowosoge and Tee 2010); aesthetic attributes (Scholz and Decker 2007); aesthetics (Hakala et al. 2015)
Tactile properties, e.g., surface	--	Smoothness, hardness (Jonsson et al. 2008); smoothness, roughness, solidness (Lindberg et al. 2013); smoothness, roughness (Bhatta et al. 2017); smoothness (Ramanakoto et al. 2017)
Technical properties, e.g., solidity, hardness	Acoustics, structural integrity (Sinclair et al. 1993); stiffness/strength of lumber (Hansen and Bush 1996, 1999); global quality, thermal insulation, acoustic insulation (Costa et al. 2011); technical quality (Toivonen 2012)	Hardness (Jonsson et al. 2008); solidness (Lindberg et al. 2013)
Longevity, e.g., resistance against moisture and decay	Absence of failure, service life, resistance to wear (Sinclair et al. 1993); durability of lumber, failure rate, long service life (Hansen and Bush 1996, 1999); product life (Costa et al. 2011)	Water sensitivity, warping, resistance against insects (Balázs 2010)
Information related to, e.g., product origin, production process and environmental impacts	Received information (Costa et al. 2011); availability of information about the producer, availability of product information (Toivonen 2012)	Product information (Donovan et al. 2004); label information (Hansmann et al. 2006); information on source of timber (Aguilar and Cai 2010); product information (Osburg et al. 2016a)
Product certificates, e.g., Swan Ecolabel, PEFC, FSC	--	Bisgby and Ozanne 2002; Teisl et al. 2002; Jensen et al. 2003; Ozanne and Vlosky 2003; Anderson and Hansen 2004; O'Brien and Teisl 2004; Veisten and Solberg 2004; Hansmann et al. 2006; Aguilar and Cai 2010; Hakala et al. 2015; Paulin et al. 2018
Price, e.g., the price of wood material vs. other materials	Sinclair et al. (1993), Costa et al. (2011)	Pakarinen and Asikainen 2001; Bigsby and Ozanne 2002; Teisl et al. 2002; Anderson and Hansen 2004; Bumgardner et al. 2007; Balázs 2010; Kuzman et al. 2012; Hakala et al. 2015; Knauf 2015
Coziness, e.g., wood enhances hominess	--	Rice et al. 2006; Nyrud and Bringslimark 2010; Hu et al. 2016
Multifunctionality, e.g., wood has many applications	Multifunctionality of product (Sinclair et al. 1993); use properties (Toivonen 2012)	--
Personal values, e.g., expressing one's identity by using wood	Ability to enhance status of the user (Sinclair et al. 1993)	Ridoutt et al. 2002; Ridoutt et al. 2005
Origin, e.g., the domesticity of wood	Domestic origin (Toivonen 2012)	Paulin et al. 2018
Environmental aspects, e.g., environmental effects of wood	Environment (Costa et al. 2011); environmental friendliness (of the product) (Toivonen 2012)	Attributes of environmental impact (Pakarinen and Asikainen 2001); attributes of environmental impact (Donovan 2004); ecological aspects (Hakala et al. 2015)
Innovativeness, e.g., new ways to use wood in housing	--	Osburg et al. 2016b
Retailer, e.g., the salesperson's knowledge of wood	Supplier/salesperson characteristics (Hansen and Bush 1996; 1999); information conveyed by store advisors (Costa et al. 2011); service (related to the product), serviceability of the sales personnel (Toivonen 2012)	Place of purchasing (Arowosoge and Tee 2010); service, shopping experience (Ji et al. 2020)

Statements are measured on a five-point Likert scale (1 = not important at all –5 = very important)

Prior to the finalization of the questionnaire, face-to-face discussions with experts from interest organizations were held (i.e., the Central Union of Agricultural Producers and Forest Owners (MTK), the Finnish Sawmills Association and the Federation of the Finnish Woodworking Industries). The experts both pretested the questionnaire and checked the relevance of the questions from a business point of view to different phases of forestry-wood value chains (i.e., operations in forestry, manufacture and refinement of sawnwood for consumer products) (for value chain examples, see Lähtinen et al. 2016b). The purpose of the two-stage process (literature review, expert discussions) was to ensure the conceptual validity of the operationalized quality indicators (quality cues and attributes) with respect to both general wood product properties (e.g., species and technical properties) and sustainability features (e.g., product certificates and personal values).

Table 3 shows that the sociodemographic background by subcategories of the respondents is, with the exception of age classes, very similar to the Finnish population in 2018 (Statistics Finland 2021). This indicates that the data are applicable for use in assessing general consumer views in the country. However, comparable statistics on education, forest ownership (respondent or family member is a forest owner), and forest sector involvement (respondent has an education or job in forest industries or in a business branch connected to forest industries, e.g., transportation or building) were not available. Regarding forest ownership, in Finland there are approximately 600 000 non-industrial private forest landowners who possess at least two hectares of forest (appr. 11% of population) (Natural Resources Institute Finland 2021). The proportion of respondents who own

Table 3. Sociodemographic background of the respondents on the survey to assess their opinions on the wooden interior product quality (n = 256) in comparison with the population in Finland aged 18–74 years in 2018 (in total 3 947 859) (StatiFin).

	% respondents	% of people living in Finland
Gender		
Female	51.6	49.8
Male	48.4	50.2
Age		
18–34 years	19.9	29.0
35–59 years	38.3	44.2
60 years or older	41.8	26.7
Education		
Basic education	6.1	N/A
General upper secondary education	6.1	N/A
Vocational upper secondary education	35.9	N/A
Higher education at university of applied sciences	24.1	N/A
Higher education at university, other academic education	25.3	N/A
Other	2.5	N/A
Municipality of residence*		
Urban municipality	72.5	72.7
Semi-urban municipality	15.3	14.9
Rural municipality	12.2	12.4
Forest ownership (oneself or family member)		
Yes	33.7	N/A
No	66.3	N/A
Forest sector involvement		
Yes	15.1	N/A
No	84.9	N/A

* Classification based on Statistics Finland (https://www.stat.fi/meta/kas/til_kuntaryhmit_en.html).

forest is higher in this survey, as the question also covered the forest holdings of family members; in Finland, forests tend to be owned by families rather than individuals (Takala et al. 2017).

As a proxy for non-response bias, the sociodemographic profiles of the first and second round respondents were compared with each other (Armstrong and Overton 1977). The results of the Chi-Square Test of Independence (Berenson and Levine 2002) did not show any indications of statistically significant differences between early and late respondents, and thus it was assumed that non-response bias would not pose significant reliability risks in the results. In addition, at this point, the means and medians of respondent Likert-scale ratings on the wood quality indicators were checked by subcategories in each sociodemographic group to assess the distributions of those sub-datasets. This was implemented to choose between parametric and non-parametric methods in analyzing the impacts of sociodemographic factors on respondent opinions (Harpe 2016). The assessments showed differences in the distributions (i.e., differences in medians for some variables by sociodemographic subcategories), which was to be taken into account in the analysis of the data described next.

4.2 Data analysis with multivariate methods

The data were analyzed with IBM SPSS Statistics 25.0 software by employing multivariate research methods in two stages. In the first stage, it was determined whether there were any factors underlying the consumers' views on different quality indicators of wooden interior products. In the second stage, it was evaluated if the views described with the factors may be connected with the sociodemographic background of the respondents.

As methods of analysis, exploratory factor analysis (EFA) (Kim and Mueller 1978; Henson and Roberts 2006; Beavers et al. 2013), the nonparametric Mann-Whitney U test (equivalent to Student's t-test to compare two independent samples such as sociodemographic groups of respondents), and the nonparametric Kruskal-Wallis test (equivalent to ANOVA with three or more independent samples (Bergmann et al. 2000; Berenson et al. 2002) were employed. The nonparametric equivalents of parametric tests were chosen, as the data were not normally distributed (Nahm 2016). In addition, there were also differences in the distributions of ratings (i.e., responses on wooden quality indicators using the Likert scale) by respondents belonging to different sociodemographic subcategories (Harpe 2016).

In the first stage of analysis, EFA with Kaiser normalization, Maximum Likelihood Estimation, and Varimax rotation was executed by employing data on respondents' views on the quality indicators of wooden interior products. The EFA assumes that a particular phenomenon may be examined by identifying latent factors caused by covariation in the data of original variables, and which are smaller in number than the original variables. Implementation of the EFA is driven both by subjective considerations (e.g., in reference to the existing theoretical and empirical literature) and statistical measures to find the final solution. As a statistical background criterion, Kaiser's eigenvalue >1 rule was employed to define the number of factors to be retained. At this phase, the results were also scrutinized with Kaiser–Meyer–Olkin measures (a minimum value of 0.50 for sampling size adequacy was used) and Bartlett's test of sphericity (i.e., correlation between the original variables). To retain an individual variable in the models, a threshold factor loading value of 0.4 was used. For reaching a solution with empirical validity, the conceptual consistency of the factor loadings and their signs were additionally scrutinized. As an outcome of the EFAs, latent variables describing respondents' perceptions of the wooden interior product quality indicators were constructed.

In the second stage of analysis, nonparametric Mann-Whitney U tests and Kruskal-Wallis tests were executed to test the relationships between the respondents' sociodemographic vari-

ables (Table 3) and the latent variables describing respondents' views on wooden interior product quality features derived from the EFA. In the results of those analyses, as evidence of statistical significance, the threshold values were $0.05 \leq p$-value < 0.1 = suggestive evidence on statistical significance, $0.01 \leq p$-value < 0.05 = moderate evidence on statistical significance, and p-value < 0.01 = very strong evidence on statistical significance. We employed Mann-Whitney tests using two-category group comparisons (i.e., gender, forest ownership and forest sector involvement), and executed Kruskal-Wallis tests for group comparisons with more than two categories (i.e., age, education, and municipality of residence).

The results of the Mann-Whitney U tests and Kruskal-Wallis tests do not provide information on how different sociodemographic groups seem to value different features of wooden interior product quality. To gain insights on that, in the final phase of analysis, the average factor scores for the constructed factors were calculated by sociodemographic groups of respondents. Average factor scores may be considered as variables, which represent how much each of the respondents scores through individual variables (e.g., wooden interior product quality indicators) on each of the factors (Young and Pearce 2013). In the context of forest sciences, a similar approach has been used previously in studies by Häyrinen et al. (2015) and Ranacher et al. (2017).

5 Results

5.1 Consumer views on individual quality cues and attributes

Table 4 illustrates the variables used in the questionnaire to assess consumer views on the quality cues and attributes of wooden interior products. The results show that the least important variables (which 11.4–19.2% of the respondents considered "not important" or "not very important") were Personal values (e.g., expressing one's identity by using wood), Product certificates (e.g., the Swan Ecolabel, PEFC, FSC), Information (e.g., product origin, production process, and environmental impacts), and Innovativeness (e.g., new ways of using wood in housing). In contrast, the most important variables for respondents (which 79.5–90.3% of the respondents considered "quite important" or "very important") were Coziness (e.g., wood enhances the feeling of hominess), Longevity (e.g., resistance against moisture and decay), Technical properties (e.g., solidity, hardness), and Multifunctionality (e.g., wood has many applications). In reference to our analytical framework, the least important variables were extrinsic cues (i.e., information, certificates) and experience attributes (i.e., personal values, innovativeness). In comparison, the most valued ones comprised both intrinsic cues (i.e., technical properties) and experience attributes (i.e., coziness, multifunctionality, longevity).

5.2 Factor solutions for consumer perceptions of the quality features of wooden interior products

The EFA on respondents' opinions on different cues and attributes of wooden interior products resulted in a four-factor outcome. In all, 13 variables from the survey were included in the final factor solution, which explains about 59% of the variation in our data (Table 5). The omitted variables with factor loading values smaller than 0.4 were related to wood species, usage of solid wood in products, and price.

The Kaiser-Meyer-Olkin measure of factorability for the results is 0.837, supporting the applicability of the data for use in exploratory factor analysis. Bartlett's test of sphericity rejected the null hypothesis that no correlation among the original variables existed ($p = <0.001$). According

Table 4. Variables on quality indicators of wooden interior products addressed in the questionnaire and the proportions of respondents with different views on their importance (n = 256). The least valued variables are underlined, and the most valued variables are bolded in the table.

Variable	Not important %	Not very important %	Neither important nor without importance %	Quite important %	Very important %	Mean
Wood species used in the product, e.g., oak, birch	1.6	8.6	27.1	41.6	21.2	3.72
Product is made of solid wood, e.g., furniture made of solid wood	0.8	7.5	24.7	45.9	21.2	3.79
Visual properties, e.g., surface patterns	--	5.5	22.0	50.2	22.4	3.89
Tactile properties, e.g., surface	0.4	3.6	20.6	54.9	20.6	3.92
Technical properties, e.g., solidity, hardness	--	2.7	13.7	**58.8**	**24.7**	**4.05**
Longevity, e.g., resistance against moisture and decay	0.4	2.7	10.6	**44.7**	**41.6**	**4.24**
Information related to, e.g., product origin, production process and environmental impacts	0.8	11.4	29.5	41.3	16.9	3.62
Product certificates, e.g., Swan Ecolabel, PEFC, FSC	1.6	12.9	30.9	41.4	13.3	3.52
Price, e.g., the price of wood material vs. other materials	0.4	3.5	22.7	53.5	19.9	3.89
Coziness, e.g., wood enhances hominess	--	1.2	8.6	**51.2**	**39.1**	**4.28**
Multifunctionality, e.g., wood has many applications	0.8	4.7	15.0	**53.0**	**26.5**	**4.00**
Personal values, e.g., expressing one's identity by using wood	3.5	15.7	28.0	33.5	19.3	3.49
Origin, e.g., the domesticity of wood	0.4	7.0	19.1	43.8	29.7	3.95
Environmental aspects, e.g., environmental effects of wood	1.6	5.9	17.8	49.4	25.3	3.91
Innovativeness, e.g., new ways to use wood in housing	1.2	10.2	26.8	45.7	16.1	3.65
Retailer, e.g., the salesperson's knowledge of wood	2.7	7.8	26.2	37.9	25.4	3.75

Table 5. Results from the final rotated four-factor solution on the variables affecting the perceived quality of wooden interior products. Bolded values are the highest factor loadings in absolute values.

Variable	Communalities (Extraction)	Factor 1 Environmental friendliness	Factor 2 Fit with lifestyle and home design	Factor 3 Visual and tactile attractiveness	Factor 4 Technical solidity
Information related to, e.g., product origin, production process, and environmental effects	0.767	**0.847**	0.171	0.058	0.131
Product certificates, e.g., Swan Ecolabel, PEFC, FSC	0.725	**0.816**	0.063	0.086	0.220
Origin, e.g., the domesticity of wood	0.576	**0.648**	0.346	0.117	0.149
Environmental aspects, e.g., environmental effects of wood	0.555	**0.670**	0.256	0.119	0.163
Coziness, e.g., wood enhances hominess	0.456	0.070	**0.603**	0.243	0.167
Multifunctionality, e.g., wood has many applications	0.657	0.175	**0.740**	0.031	0.277
Personal values, e.g., expressing one's identity by using wood	0.494	0.303	**0.602**	0.196	0.032
Innovativeness, e.g., new ways to use wood in housing	0.558	0.414	**0.564**	0.181	0.188
Visual properties, e.g., surface patterns	0.999	0.036	0.174	**0.976**	0.126
Tactile properties, e.g., surface	0.419	0.188	0.202	**0.572**	0.127
Technical properties, e.g., solidity, hardness	0.404	0.151	0.196	0.203	**0.549**
Longevity, e.g., resistance against moisture and decay	0.770	0.144	0.113	0.024	**0.858**
Retailer, e.g., the salesperson's knowledge of wood	0.301	0.276	0.194	0.115	**0.417**
Cronbach's a		0.870	0.780	0.763	0.665
Eigenvalues		5.138	1.594	1.261	1.102
Explained variance, %		15.774	29.442	7.309	6.543

to the results, the quality indicators can be grouped into four factors describing the quality features of wooden interior products: perceived environmental sustainability of the product (Factor 1: Environmental friendliness), perceived social benefits in use at home (Factor 2: Fit with lifestyle and home design), perceived aesthetics and appeal of the surface of the final product (Factor 3: Visual and tactile attractiveness), and perceived technical sustainability and information received at retail store (Factor 4: Technical solidity).

The results indicate that the factors connect in multiple ways with sustainability and different value chain phases. The "Environmental friendliness" factor comprises extrinsic cues and credence attributes describing the environmental sustainability aspects of processes and the final product, while "Fit with lifestyle and home design" relates to social issues (e.g., human wellbeing). It is composed of experience attributes (i.e., coziness, personal values, multifunctionality, and innovativeness). From the perspective of value-chain phases, all attributes connect only to the appreciation of interior wooden product qualities revealed at the actual consumption phase. Compared to other factors, "Visual and tactile attractiveness" is the only factor that is solely comprised of intrinsic cues (i.e., visual properties, tactile properties). In "Technical solidity," one of the attributes directly connects with intrinsic cues (i.e., technical properties), one with experience attributes (i.e., longevity), and one with extrinsic cues (i.e., retailer) that relate to the salesperson's knowledge of wood.

Fig. 2 illustrates the connections between the four-factor solution and a value chain of carpentry products, which comprises forest management and logging (i.e., operations in forestry), processing of wooden interior products (i.e., manufacture and refinement of sawnwood for consumer products), and the utilization of the products by end users. In comparison with the first and second factors describing consumer perceptions of environmental and social sustainability, both the third and fourth factors are more related only to the properties of the final products from the perspective of either attractiveness or solidity. In addition, while the "Visual and tactile attractiveness" factor describes the existence of consumer preferences mainly driven by self-evaluated properties of the product, which are subjective and not necessarily rational, the "Technical solidity" factor is an indication of the existence of value preferences that are more connected to the rational evaluation of the applicability of wooden interior products for a particular use. In addition, the longevity of products is also connected to long-term economic benefits due to, for example, the possibilities for maintenance and reuse instead of demolition.

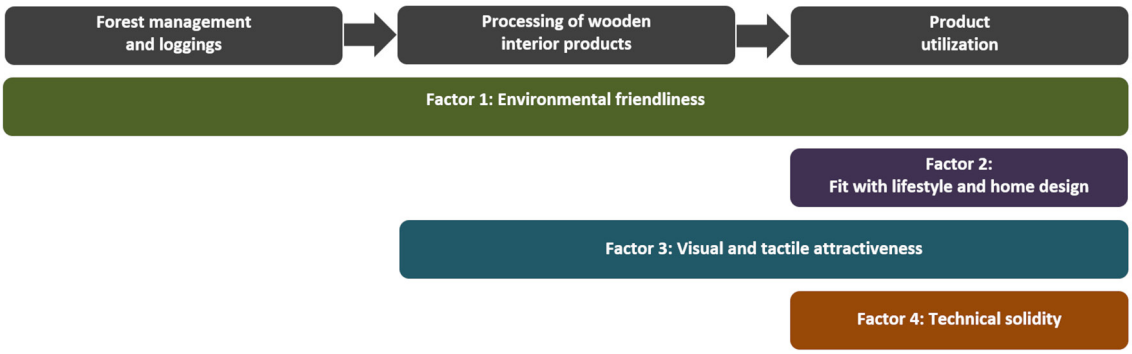

Fig. 2. Connections between four-factor solution for consumer views on wooden interior product quality and different phases of forestry-wood value chains.

5.3 Connections between consumer perceptions of wooden interior product quality and sociodemographic background

Mann-Whitney results on two-category sociodemographic groups (i.e., gender, forest ownership, forest sector involvement) are presented in Table 6, and Kruskal-Wallis test results for sociodemographic groups with more than two categories (i.e., age, education, municipality of residence) are illustrated in Table 7. Apart from municipality of residence, all other sociodemographic variables showed signs of being statistically significantly related to at least some latent variables on respondent views on the quality features of wooden interior products.

For "Environmental friendliness," there is statistical evidence that age is a sociodemographic characteristic connected with differing views on wooden interior product quality features (for all age groups $p=0.037$). The opinions of respondents varied especially between those aged 18–34 and 60 or older ($p=0.013$). According to statistical analysis, opinions linked with "Fit with lifestyle and home design" were especially related to gender ($p=0.028$), education ($p=0.031$), forest ownership ($p=0.068$), and forest sector involvement ($p=0.004$), while for views on "Visual and tactile attractiveness" statistical evidence was found only for a relationship with gender (p-value 0.082). Based on the statistical analysis, "Technical solidity" was linked to forest sector involvement ($p=0.023$) and education ($p=0.001$).

Furthermore, the average factor scores for "Environmental friendliness", "Fit with lifestyle and home design", "Visual and tactile attractiveness", and "Technical solidity" were calculated by sociodemographic groups of respondents (indications of statistically significant differences between groups are also shown in Figs. S1–S5, see Supplementary file S1 at https://doi.org/10.14214/sf.10605). Such results for municipality of residence are not illustrated due to the lack of indications of statistically significant differences between respondents living in urban, semi-urban, or rural areas. For "Environmental friendliness," the higher average factor scores originated from ratings given by respondents aged 60 or older than those aged 18–34 while in the case of "Fit with lifestyle and home design" and "Visual and tactile attractiveness" the average scores were higher in the group of females than males. "Fit with lifestyle and home design" also received higher averages for factor scores among those with connections to forest ownership and forest sector involvement than from those without such linkages. Furthermore, for "Fit with lifestyle and home design", the higher average factor scores originated from ratings given by respondents with vocational upper secondary education than respondents with general upper secondary education, basic education,

Table 6. Mann-Whitney U test results, which showed statistically significant differences in respondent views on wooden interior product quality indicators (i.e., factors derived from exploratory factor analysis) by sociodemographic groups.

Factor	Groups compared	p-value
Fit with lifestyle and home design	Female vs. male	0.028**
Visual and tactile attractiveness	Female vs. male	0.082*
Fit with lifestyle and home design	Forest sector involvement vs. no forest sector involvement	0.004***
Technical solidity	Forest sector involvement vs. no forest sector involvement	0.023**
Fit with lifestyle and home design	Forest ownership vs. no forest ownership	0.068*

* = Suggestive evidence on statistical significance = $0.05 \leq p$-value < 0.1;
** = Moderate evidence on statistical significance = $0.01 \leq p$-value < 0.05;
*** = Very strong evidence on statistical significance = < 0.01 p-value.

Table 7. Kruskal-Wallis test results, which showed statistically significant differences in respondent views on wooden interior product quality indicators (i.e., factors derived from exploratory factor analysis) by sociodemographic groups.

Factor	Groups compared	*p*-value for all groups	*p*-value for groupwise comparisons
Environmental friendliness	All age groups	0.037**	
	18–34 years vs. 35–59 years		0.238
	18–34 years vs. 60 years or older		0.013**
	35–59 years vs. 60 years or older		0.335
Fit with lifestyle and home design	All education groups	0.031**	
	General upper secondary education vs. higher education at university, other academic education		0.050**
	General upper secondary education vs. vocational upper secondary education		0.009***
	Basic education vs. vocational upper secondary education		0.037**
	Vocational upper secondary education vs. higher education at university of applied sciences		0.092*
Technical solidity	All education groups	0.001***	
	Basic education vs. vocational upper secondary education		0.012**
	Basic education vs. general upper secondary education		0.013**
	Higher education at university, other academic education vs. vocational upper secondary education		0.001***
	Higher education at university, other academic education vs. general upper secondary education		0.006***
	Vocational upper secondary education vs. higher education at university of applied sciences		0.022**
	Higher education at university of applied sciences vs. general upper secondary education		0.039**

* = Suggestive evidence on statistical significance = 0.05 ≤ *p*-value < 0.1;
** = Moderate evidence on statistical significance = 0.01 ≤ *p*-value < 0.05;
*** = Very strong evidence on statistical significance = < 0.01 *p*-value.

or higher education at the university of applied sciences. In addition, both the respondents with general and vocational upper secondary education and those with forest sector involvement gave higher average scores to the "Technical solidity" of wooden interior products than the respondents with other types of educational backgrounds or those without forest sector involvement.

6 Discussion

The purpose of the study was to provide information on how sustainability issues connect to consumer perceptions of quality in the case of wooden interior products. As an analytical framework, we employed the Model of the Quality Perception Process (Steenkamp 1989) for identification of the quality indicators by using peer-reviewed journal articles linked with different aspects of wood product quality, marketing, and/or end users.

According to the results of exploratory factor analysis (EFA), the quality indicators can be grouped into four latent variables describing consumer perceptions of the quality features of wooden interior products (i.e., four factors that explained 59% of variation in the data): "Environmental friendliness", "Fit with lifestyle and home design", "Visual and tactile attractiveness",

and "Technical solidity", which are in multiple ways connected with sustainability (e.g., perceived environmental or social sustainability, or technical durability). In addition, technical durability is also linked with environmental and economic sustainability, for example, through the repairability of wooden interior products. Earlier studies such as Toppinen et al. (2013) have also arrived at similar findings on the connections between consumer preferences for environmental, economic, or social sustainability.

In the results, "Fit with lifestyle and home design" connects with seeking individual well-being in home environment in the form of social sustainability, while "Visual and tactile attractiveness" describes the appeal of the final products and does not reflect any preferences for sustainable consumption. However, the factors of "Environmental friendliness" and "Technological solidity" are more comprehensively connected to various sustainability aspects at different phases of forestry-wood value chains. "Environmental friendliness" connects to altruistic expectations on environmental sustainability, and although "Technical solidity" as such refers to preferences concerning the intrinsic technical properties of products, the longevity of wooden interior products is also linked with environmental sustainability. This is especially the case when the raw material originates from sustainably managed forests and the processing of the final products has been environmentally and socially responsible.

Furthermore, forest management and logging have varying environmental impacts, and if those practices are appropriate in specific habitats from the perspective of both environmental and technical aspects, synergic sustainability benefits may be gained. For example, forest management practices can be aligned to enhance both multiple ecosystem services and timber quality (Holm 2015). In processing, for example, automatization in scaling and sorting of logs and sawnwood enables increasing efficiency (e.g., decrease in use of virgin materials and environmental impacts) and improving the technical quality of wooden interior products (e.g., sawnwood grading). Finally, in addition to the choice of the right materials for the right purposes (e.g., product information or knowledge of retailers), the technical durability of wooden interior products is affected by, for example, surface treatments (e.g., environmentally friendly thermal or chemical modifications), and the life-cycle of products can be extended.

Different types of purchasing choices may all result in sustainable consumption (e.g., technical durability connects with longevity, which may support environmental sustainability). Thus, it is important that consumers with varying preferences are provided with comprehensive information about the products, especially to avoid prejudices caused by lack of knowledge (Lähtinen et al. 2019). Aligned with our results on "Environmental friendliness" and "Technical solidity" in particular, earlier studies have found that consumers appreciate both the environmental (Anderson and Hansen 2004; Roos and Hugosson 2008; Roos and Nyrud 2008; Aguilar and Cai 2010; Paulin et al. 2018) and technical properties (Lähtinen et al. 2019; Kylkilahti et al. 2020; Khojasteh-Khosro et al. 2020) of wooden products in their homes. Furthermore, although some consumers may appreciate certain intrinsic technical properties of wood, for others prejudices due to deficiencies in their knowledge on more extrinsic cues (i.e., information on technical properties) may hinder the use of wood products in homes (Lähtinen et al. 2019).

Connected to our results on consumer expectations on "Fit with lifestyle and home design" and "Visual and tactile attractiveness," evidence on similar consumer preferences has also been gained in earlier studies. For example, according to Häyrinen et al. (2020) and Viholainen et al. (2020), consumers consider wooden materials to be cozy. In addition, there is also evidence that the use of wood in housing construction affects homeowners' perceptions of their identities (Ridoutt et al. 2005). Especially with respect to the visual and tactile properties of wood, it has been found that consumers prefer smooth surfaces in particular (De Morais and Pereira 2015; Ramanakoto et al. 2017; Ramanakoto et al. 2019), and that by using vision and touch they are capable of distin-

guishing natural wood from artificial materials (Overlievt and Soto-Faraco 2011). Yet, although consumers have been found to appreciate the naturalness of wood in the home environment (Jonsson et al. 2008; Nyrud and Bringslimark 2010; Bhatta et al. 2017; Moresová et al. 2019), this does not necessarily lead to sustainable purchasing behavior. In particular, if consumers lack interest in the environmental or technical properties of wooden interior products, which leads them to choose offerings that cannot be repaired, reused, or recycled, preferring wood products as such does not necessarily lead to sustainable consumption choices.

Regarding the connections between consumer perceptions of wooden interior product quality and their sociodemographic background, our Mann-Whitney U test and Kruskal-Wallis test results showed that statistical indications of such phenomena seem to exist. In general, differences between respondents were found to exist by gender, age, education, forest ownership, and forest sector involvement. According to the results, the municipality of residence did not seem to relate to consumers' perceptions of the quality features of wooden interior products.

The environmental sustainability of wooden interior products (i.e., "Environmental friendliness") was rated higher by older respondents (60 years old or older) than younger respondents (18–34 years old). In the context of Finland, Holopainen et al. (2014) have obtained similar findings that older consumers especially value the sustainability of wood products, while in an international context, younger consumers have been commonly seen as a group of consumers that especially appreciates their environmental properties (Thompson et al. 2010; Høibø et al. 2015). Our results indicate that appreciation of the environmental sustainability of wood interior products may not be straightforwardly connected to younger generations, but may be affected by factors such as cultural traditions, experiences, and knowledge of using wood in the home environment in either interiors or load-bearing structures (Lähtinen et al. 2021). This is also an indication that, similar to sustainability aspects, linkages between intrinsic and extrinsic properties are multidimensional and support each other as factors of quality in the eyes of consumers.

Preferences for social well-being (i.e., "Fit with lifestyle and home design") was in comparison with other groups of respondents mostly valued by females, respondents with vocational upper secondary education, forest owners (respondent or family member), and respondents with forest sector involvement (education or profession). In earlier studies, forest ownership (Ranacher et al. 2017) and forest sector involvement (Aguilar et al. 2021) have been found to affect consumer views on forest and wood products in general. However, according to our knowledge there is no previous research information on how gender or other sociodemographic variables might be linked with consumer expectations on wooden interior products as a part of their self-identity in the home environment. For example, for some groups of consumers, wooden interiors might not be primarily connected to home decoration with finished products, but instead to the possibility to express oneself with more demanding do-it-yourself building and design projects. In addition, the aim of seeking to foster well-being benefits in the home environment does not directly indicate that other wooden product quality aspects would not matter. These aspects may also be important and such consumers might prefer wood in their home environment because they perceive it as an environmentally sustainable material.

The visual and tactile intrinsic cues of wooden interior products (i.e., "Visual and tactile attractiveness") were more valued by females than men. In previous studies, gender has been found to affect the preferences for different wood species (Nicholls and Bumgardner 2007) and wooden panels (Nicholls and Barber 2010). Furthermore, wood character marks have been found to increase willingness-to-pay among female consumers (Bumgardner et al. 2009). Thus, our results support the existing information on the differences in visual and tactile wood product properties by gender.

The technical aspects of wooden interior products (i.e., "Technical solidity"), were especially appreciated by respondents with a vocational or general upper secondary education and

those with forest sector involvement compared to respondents with higher education (universities or other academic education) or those without forest sector involvement. To our best knowledge, the effects of education or forest sector involvement on the appreciation of perceived technical sustainability have not been studied before. Our results may be explained by the fact that people with blue collar professions and/or connections with the forest sector may have more personal experiences of working with wood and the intrinsic properties of wood products, and are thus also more aware of the variety of wooden interior products (e.g., species, surface treatments, properties of final products). As a result of this, they may also have more skills to evaluate the technical properties of wood products and greater interest in acquiring more information on them than those respondents without specific personal experience or knowledge on, for example, the variety of timber products available in the markets.

The findings of our study show that consumer perceptions of wooden interior product quality are not affected solely by the physical attributes of wood products. Instead, preferences are much more complex phenomena driven by culture, experiences, lifestyle, and knowledge, which are either directly or indirectly reflected in views and knowledge on wooden interior products in relation to both quality cues and attributes. Indications of such patterns can be perceived especially through the results on connections between sociodemographic factors such as forest ownership, which a study by Ranacher et al. (2017) also found to be connected with consumer attitudes toward forest-based services and products. In addition, preferences other than the ones related to environmental sustainability and intrinsic properties of wood products may also result in sustainable choices (e.g., technical durability) if environmentally responsible practices are followed in forest management, logging, and manufacturing processes. Regarding preferences on technical durability, in our results respondents with lower education levels seem to have more sustainable wooden interior product quality preferences than others.

It is also worth noting that due to the complexity of drivers affecting perceptions of wooden interior product quality, one may not straightforwardly conclude that some sociodemographic groups would act more responsibly than others. For example, our results show that in the context of wooden interior products, it is not self-evident that younger generations are environmentally aware. It must also be kept in mind that although a consumer may especially appreciate some quality attributes in wooden interior products, she/he may also have other, less conscious views on products that are reflected in his/her product preferences. For example, the perceived well-being benefits received through wooden interior products in home environments may be driven by a consumer's interest in positioning him-/herself as someone who appreciates the utilization of durable high-quality materials. Regarding our results, broader linkages with self-identity could also explain why, for example, forest sector involvement seems to be connected with appreciation of the social benefits of wooden interior products in home environments.

As a limitation of the study, it must be kept in mind that although the random sample of consumers comprised 1000 recipients, and the response rate (25.6%) was relatively high as compared with surveys in general (Kaplowitz et al. 2004), the results are still based on a limited number of consumers living in Finland. In addition, most of the respondents lived in urban municipalities (72.5%). It is also worth pointing out that our survey questions measured consumer perceptions of specific wooden interior product attributes instead of, for example, addressing the choices consumers make in actual purchasing situations. However, since it is challenging to acquire reliable information on purchasing behavior through surveys, in the future it would be useful to gather consumer data in actual purchasing contexts (e.g., retail stores). This would enable obtaining more profound knowledge in a real-life situation such as with respect to how different sensory (e.g., smell, touch) and psychographic (e.g., experience, beliefs, knowledge, personal values) aspects affect consumer purchasing choices (Osburg 2016; Luo et al. 2018; Tan et al. 2019; Kylkilahti et al. 2020).

Enhancing sustainable consumption of wood products enables seeking possibilities for increasing carbon storage and reducing greenhouse gas emissions in housing (Petersen and Solberg 2005; Luo et al. 2018). According to our findings, consumers perceive the features of wooden interior product quality as mixes of intrinsic and extrinsic cues, and experience and credence attributes, which are linked with sociodemographic characteristics. In addition, especially from the perspective of the self-identity of consumers, wooden interior products should be designed to meet different types of product quality expectations in the home environment. In all, our results indicate that the sustainability of wooden interior products does not only relate to environmental aspects or particular value chain phases. Consequently, sustainability should be addressed as a multidimensional issue with environmental, social, and economic aspects connected with different phases of forestry-wood value chains. In the future, more information is needed on how consumers with different motivations evaluate the dimensions of sustainability in the context of wood product purchasing choices.

Supplementary files

S1.pdf; Average factor scores by sociodemographic groups, available at https://doi.org/10.14214/sf.10605.

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Authors' contributions

Charlotta Harju: Survey design for data gathering, implementation of data gathering, idea of the study, selection of the theoretical framework, formulation of the research questions, design and implementation of the analysis, interpretation of the results, scientific writing of the manuscript, and finalization of the article.

Katja Lähtinen: Survey design for data gathering, formulation of the research questions, design and implementation of the analysis, interpretation of the results, and scientific writing of the manuscript.

Declaration of openness of research materials and data

The data were collected from Finnish consumers and it is confidential and thus not available. All calculus has been implemented according to SPSS standards (visual user interface), and opened up in detail in the text. Thus, those descriptions are comparable with syntax coding.

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