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Sustainable Consumer Behavior in Omnichannel Electronics Retailing: Evidence from a Pilot Study

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Abstract

Purpose – Sustainability is becoming increasingly important in shaping consumer behavior in omnichannel retailing. The consumer electronics retail sector, which is characterized by a disproportionately high share of online sales compared other industries and a poor environmental performance, faces particular challenges in this regard. While numerous studies have investigated the relationship between individual consumer characteristics and organizational factors, there is a lack of integrated analyses in the omnichannel environment for consumer electronics. This pilot study seeks to address this gap by exploring how sustainability influences consumer behavior, with a specific focus on green purchase intention in an omnichannel setting.

Design/methodology/approach – The pilot study focused on consumers who had purchased consumer electronics from omnichannel retailers within the past 24 months. Participants were recruited through a professional online panel in February 2025. A total of 125 valid responses were analyzed using structural equation modelling (PLS-SEM) with the software SmartPLS 3, following a structured multi-step approach.

Findings – The model examines the interplay between environmental awareness, shopping experience, brand identification, sustainable measures, and channel integration regarding purchase intention. The results indicate that brand identification directly affects purchase intention, while environmental awareness is significantly related to the perception of sustainable measures. Furthermore, the study confirms the positive impact of channel integration on the shopping experience; however, the shopping experience does not significantly affect purchase intention.

Originality – The work provides new insights into the relationship between sustainability and consumer behavior in the electronics omnichannel retail sector and establishes a foundation for further research with the developed structural model.

Keywords: consumer behavior, omnichannel retail, purchase motivation, sustainability

Paper type: Research Article

1. Introduction

Omnichannel shopping has fundamentally transformed retail (Verhoef, 2021). It aims to seamlessly integrate all sales and communication channels, creating a consistent, cross-channel shopping experience (Lemon & Verhoef, 2016). The omnichannel journey allows consumers to research online, to test products in-store, and purchase through the most convenient channel (Verhoef et al., 2015). While channel diversity improves the customer experience, it is accompanied by environmental challenges, particularly in the consumer electronics industry, where online sales account for a significantly larger share than in most other retail sectors (Olaf Roik, 2023).

Recent academic literature highlights an increasingly intense discourse on sustainability in corporate practices, addressing challenges and responsibilities across the entire value chain (Sousa et al., 2021; Vadakkepatt et al., 2021). Omnichannel retailing is associated with higher energy and resource consumption due to complex supply chains, packaging, and returns (Buldeo Rai, 2019, 2021; Buldeo Rai et al., 2019; X. He et al., 2023). Regulatory requirements and the complexity of coordinating energy-efficient supply chains further intensify these challenges (X. He et al., 2023; Moshood et al., 2021; Sousa et al., 2021; Xu et al.,

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2023). In addition to ecological and economic considerations, the social dimension of sustainability is gaining prominence in current academic research. Consumers increasingly favor companies that demonstrate environmentally and socially responsible business practices (Buldeo Rai, 2019; Sousa et al., 2021). The consumer electronics sector reflects these pressures strongly, given its high resource consumption, short product life cycles, and complicated recycling processes (Bergener, 2023; Wu et al., 2024).

Despite broad consensus on growing consumer demand for sustainable solutions, empirical evidence on how sustainability factors influence consumer electronics purchasing decisions in an omnichannel context remains limited. To address this gap, the present pilot study develops and empirically tests a hypothesis-driven structural equation model (SEM). The model examines the effects of individual factors (environmental awareness, shopping experience) and organizational factors (channel integration, brand identification, sustainable measures) on purchase intention.

RQ1: To what extent do individual factors such as environmental awareness and shopping experience influence purchasing decisions for consumer electronic goods in an omnichannel retail setting?

RQ2: To what extent do organizational factors such as channel integration, brand identification, and sustainability measures influence purchasing decisions for consumer electronic goods in an omnichannel retail setting?

RQ3: What direct and indirect relationships exist between individual and organizational factors in shaping purchase intentions in an omnichannel retail setting?

A sample of 125 consumers who had purchased electronic products from omnichannel retailers within the past 24 months were analyzed to answer the research questions. Building on current literature, the study derives and empirically tests a set of hypotheses using structural equation modelling (SEM). The results provide initial insights into the relationships between sustainability-related factors and purchasing behavior in an omnichannel context and lay the foundation for further research.

2. Theoretical background and hypothesis development

To ground the hypotheses in practice, this section develops a conceptual model based on current scientific literature and formulates hypotheses that examine the influence of individual and organizational factors on consumer decisions.

2.1 Environmental challenges of omnichannel retailing in consumer electronics

Omnichannel retailing is associated with significant environmental impacts, particularly in the areas of transport, logistics, and packaging (X. He et al., 2023; Sallnäs & Björklund, 2020; Xu et al., 2023; Yu et al., 2020). Complex delivery processes, high return rates, and the so-called 'last mile' lead to increased energy and resource consumption (Bosona, 2020; Buldeo Rai et al., 2019). The high demand for packaging materials to ship a single product (Sallnäs & Björklund, 2020; Xu et al., 2023) and high return rates in omnichannel retailing increase transportation costs and the ecological footprint (Karlsson et al., 2023; Sallnäs & Björklund, 2020).

In addition to the structural challenges of the omnichannel retailing model itself, the consumer electronics products distributed through these channels are also associated with considerable environmental impacts. The consumer electronics sector includes a wide range of products, such as smartphones, laptops, televisions, and household appliances, which are deeply embedded in everyday routines (Olaf Roik, 2024). In Germany, the consumer electronics market – including entertainment electronics, private telecommunications, and IT products – generated a turnover of 28.9 billion euros in 2024, illustrating its economic and social significance (Blum, 2025). Key sustainability concerns include high resource and energy consumption during production and use, dependency on rare earths, and short product life cycles which contribute to the growing volumes of electronic waste (Althaf et al., 2021; Li et al., 2015; Meyer &

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Katz, 2016; Ramprasad et al., 2022). At the same time, consumer electronics are central to digital lifestyles and strongly shape shopping behavior. Constant product innovations, high price sensitivity, and the widespread habit of gathering information across different channels, with 61 percent of consumers researching online before buying in-store, strongly shape purchasing decisions (Gerling et al., 2025). The combination of considerable sustainability challenges, substantial market volume, and complex, cross-channel consumer behavior makes the consumer electronics sector an essential field for exploring sustainable purchasing decisions and emphasizes its importance for the development of future-oriented omnichannel strategies.

2.2 Individual factors influencing consumer behavior

2.2.1 Environmental Awareness

Scientific literature increasingly addresses environmental awareness as a critical driver of sustainable consumer behavior. Consumers actively contribute to ecological innovation (Buldeo Rai, 2019; Galli et al., 2022; Jena & Meena, 2022), even though sustainable business models tend to be more cost-intensive (Bauer, 2021). Environmental awareness refers to individual awareness, ethical attitudes, and understanding of environmental issues, as well as the responsible use of natural resources (Naparin & Karsudjono, 2025). In this study, environmental awareness is understood as a multidimensional construct encompassing: cognitive aspects (knowledge about environmental problems and resource use), affective aspects (ethical attitudes and values related to environmental protection), and behavioral tendencies (willingness to act according to sustainability principles) (Wiwik Handayani et al., 2021). Consumers with high environmental awareness tend to avoid environmentally harmful products, accept compromises such as longer delivery times if these are more environmentally friendly, and actively seek information about the sustainability practices of products and companies (Buldeo Rai, 2019; Dunlap et al., 2000; Saari et al., 2021; Shao & Lassleben, 2021; Wiwik Handayani et al., 2021). Previous research suggests that environmental awareness can act as an important precursor to environmentally friendly behavior, as higher awareness increases the likelihood that values and knowledge will translate into sustainable actions (Mkumbachi et al., 2020). In this sense, environmental awareness provides a foundation for behaviors that support environmentally responsible consumption.

Although environmental awareness has been identified as a significant driver of sustainable behavior in sectors such as cosmetics and fashion (Bilińska-Reformat & Dewalska-Opitek, 2021; Teixeira et al., 2023; Zahid et al., 2018), its specific impact on purchasing decisions for consumer electronics in omnichannel retail remains underexplored. At the same time, studies from other industries suggest that environmentally aware consumers evaluate sustainable measures positively and are willing to accept compromises in convenience for ecological benefits (Vhatkar et al., 2024; Yao et al., 2024). It is therefore interesting to investigate whether these findings also apply to the consumer electronics sector and how environmental awareness influences the perception of sustainable measures, the overall shopping experience, and consumers' green purchase intentions. Based on these insights, the following hypotheses are proposed:

H1: Environmental awareness (EA) positively influences consumers' perception of sustainable measures (SM).

H2: Environmental awareness (EA) positively influences the shopping experience (SE).

H3: Environmental awareness (EA) positively influences green purchase intention (GPI).

2.2.2 Shopping experience

Shopping experience describes the overall perception and evaluation of the purchasing process across channels and includes various components, with customer satisfaction as a central element (Ha & Perks, 2005). Customer satisfaction refers to the degree to which a product or service meets consumer expectations and is widely recognized as a key determinant of purchase intention (Kim et al., 2009; V. Lee

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et al., 2022). Within omnichannel retailing, the shopping experience is shaped by aspects such as convenience, trust, and comfort (Ng et al., 2021). An efficient 'last mile' delivery process has also been identified as a significant factor influencing both the shopping experience and customer satisfaction (Tyrväinen & Karjaluoto, 2019). Building on these findings, this study conceptualizes shopping experience as an overarching construct that includes satisfaction with the purchasing process, the extent to which product quality meets expectations, the likelihood of recommending the retailer, and the perceived pleasantness of the overall shopping journey. It may therefore be assumed that, within an omnichannel environment for consumer electronics, a more positive shopping experience – combined with higher customer satisfaction – positively affects purchase behavior particularly in relation to sustainable decision-making.
H4: Shopping experience (SE) positively influences green purchase intention (GPI).

2.3 Organizational factors influencing consumer behavior

2.3.1 Sustainability measures

Although sustainability-related discussions in the context of omnichannel retailing have expanded (Klein & Popp, 2023; Sfakianaki et al., 2022) and environmental aspects are becoming increasingly relevant to customers, these attitudes are frequently not translated into actual purchasing behavior (Ebner et al., 2022). For instance, researchers have identified a low level of consumer interest in environmentally friendly delivery options within the omnichannel retail context (Buldeo Rai et al., 2019; Sallnäs & Björklund, 2020). At the same time, evidence suggests that sustainable measures can enhance brand visibility and foster loyalty (Kembro & Norrman, 2019; Sousa et al., 2021). In this study, sustainability measures are defined as concrete retailer initiatives that aim to reduce environmental impact, such as CO_2-neutral delivery, sustainable packaging, and return or recycling systems. The survey captures these dimensions by asking respondents whether they prefer environmentally friendly packaging, value eco-friendly delivery options, and consider a retailer's sustainability measures before making a purchase.

Given the inconsistent empirical evidence on the effects of sustainability measures on consumer behavior, and considering the substantial environmental footprint of consumer electronics, it is particularly relevant to analyze the impact of specific measures – such as CO_2-neutral shipping, sustainable packaging, and return systems – on the shopping experience. This leads to the following hypothesis:
H5: Sustainable measures (SM) in omnichannel retail, particularly for consumer electronics products, positively influence shopping experience (SE).

2.3.2 Channel integration

Channel integration describes the coordinated linking of all sales and communication channels to create a consistent customer experience in an omnichannel environment (Verhoef et al., 2022). A high level of channel integration is considered a key success factor (Z. W. Lee et al., 2019; Mirsch et al., 2016), as it enhances the shopping experience and trust (Buckley et al., 2024; Chen et al., 2023; Pereira et al., 2023) and positively influences purchase intent (Zhang et al., 2018) and sales growth (Cao & Li, 2015). However, achieving high channel integration quality is complex and requires not only technical integration but also the coordination of data management and cross-channel consumer behavior (Briel, 2018). This also applies to the integration of sustainable measures, such as CO_2-reduced supply chains, green delivery solutions, and recycling-oriented return programs for used electronic devices (X. He et al., 2023; Y. He et al., 2020; Kayikci, 2018).
It can therefore be assumed that the seamless and transparent integration of sustainability initiatives and measures enhances consumer satisfaction and positively influences purchasing decisions in consumer electronics retail. This leads to the following hypotheses:

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H6: Channel integration (CI) positively influences shopping experience (SE).
H7: Channel integration (CI) positively influences green purchase intention (GPI).

2.3.3 Green Brand Identity

According to the 'Social Identity Theory', individuals derive aspects of their identity from social groups, such as political parties or sports teams (Tajfel & Turner, 1986). In a consumer context, this identification can extend to brands. When consumers recognize their personal values in a brand, the brand may similarly serve as a source of social identification (Shao & Lassleben, 2021). Brands that credibly communicate sustainability may function as a source of "green" identification, as consumers perceive their environmental values as being reflected in the brand (Huang et al., 2014; Lin et al., 2017). A prominent example is the outdoor manufacturer Patagonia , whose sustainability-oriented brand positioning fosters strong consumer identification (Michel et al., 2019). In this pilot study, survey items were formulated to capture this mechanism. Respondents were asked, for example, whether they identify with brands that promote sustainability, feel emotionally connected to brands supporting environmentally friendly practices, and perceive sustainable measures as increasing their loyalty. Previous studies, particularly from the fashion industry, show that sustainable brand management in an omnichannel context strengthens brand visibility, customer satisfaction, and the shopping experience, as well as purchase intention (Purcărea et al., 2022; Shao & Lassleben, 2021; Vhatkar et al., 2024). Given these findings, it is assumed that such associations are transferable to the consumer electronics sector leading to the following hypotheses:
H8: Green Brand identification (BI) positively influences consumers' green purchase intention (GPI).
H9: Green Brand identification (BI) positively influences shopping experience (SE).

3. Methodology

3.1 Research design and structural model

This pilot study adopts a hypothesis-driven quantitative research design based on an online survey. It aims to theoretically evaluate hypotheses and empirically examine the relationships between individual factors (e.g., environmental awareness, shopping experience) and organizational factors (e.g., sustainability measures, brand identification, channel integration). The study further analyzes how these factors influence consumer behavior and purchase intention in the context of omnichannel retailing. Structural equation modelling (SEM) was employed to test and validate the structural model, which depicts these relationships (Table 1, Figure 2).

Table 1 Overview of the structural components and their relationship

Factor	Variable	Hypothesis	Influencing	Explanation
Individual	Environmental Awareness (EA)	H1, H2, H3	Sustainability Measures (SM) Shopping Experience (SE) Green Purchase Intention (GPI)	Environmentally aware consumers tend to perceive sustainable measures more positively. Environmental Awareness also enhances the shopping experience and increases the intention to make green purchases.
	Shopping Experience (SE)	H4	Green Purchase Intention (GPI)	Satisfied customers have a higher green purchase intention.
Organizational	Sustainability Measures (SM)	H5	Shopping Experience (SE)	Sustainability measures increase the shopping experience.

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	Channel Integration (CI)	H6, H7	Shopping Experience (SE) Green Purchase Intention (GPI)	Seamless integration of channels increases the shopping experience and influences green purchase intention.
	Green Brand Identity (BI)	H8, H9	Green Purchase Intention (GPI) Shopping Experience (SE)	A strong brand identity increases the shopping experience and influences green purchase intention.
Final Outcome	Green Purchase Intention (GPI)	-	-	Final outcome variable based on influencing factors.

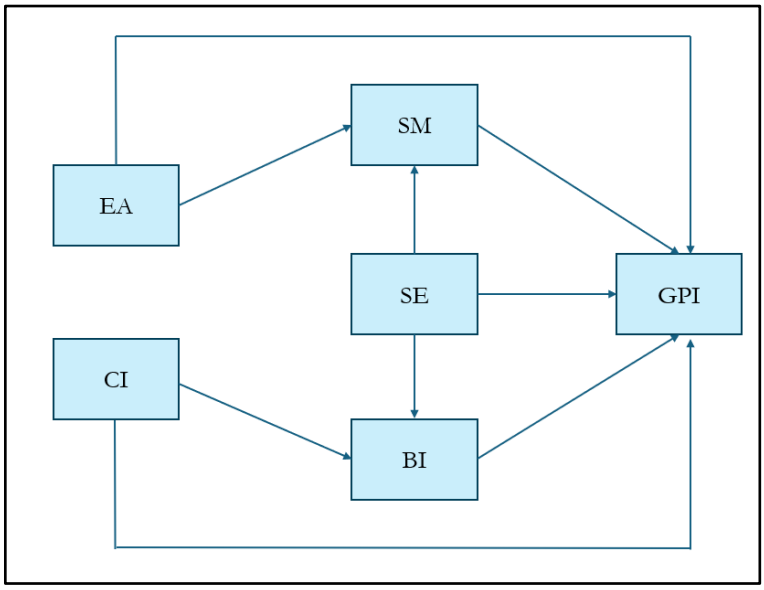

Figure 1 Structural model of the research

3.2 Sampling and data collection

The pilot study focused on consumers who had purchased electronic consumer goods (such as smartphones, notebooks, cameras, or household appliances) from omnichannel retailers within the past 24 months. Participants were recruited through a professional online panel that provides access to pre-registered survey participants. The panel setup ensured that only respondents residing in Germany and aged at least 18 years old were invited to the survey. Within the questionnaire, a screening question verified eligibility so that only consumers who had purchased an electronic consumer product from an omnichannel retailer within the past 24 months were able to proceed. The panel settings allowed all genders, all household income levels, and respondents from all German regions to participate, without quotas for age, gender, or regional distribution. The sampling approach can be described as non-probabilistic, panel-based sampling. Participants were recruited from an existing pool of voluntary panel members rather than randomly selected from the entire population, meaning that not every consumer in Germany had an equal chance of being included in the study. Consequently, the results are valid only for the examined consumer group and cannot be generalized to all omnichannel electronics consumers. The survey was conducted online in February 2025. Participation was voluntary and anonymous, and respondents could withdraw at any time. Ethical approval for the study was obtained from the Interim Ethical Committee of the Doctoral School of Economic and Regional Sciences at the Hungarian University of Agriculture and Life Sciences. In total, 125 fully completed questionnaires were included in the analysis. Although the sample is relatively small, it

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exceeds the minimum threshold of 100 cases for exploratory PLS-SEM studies and complies with the so-called "ten-times rule", making it appropriate for this pilot study (Odunga et al., 2024). Nevertheless, the limited sample size should be considered when interpreting the findings.
The demographic data show that 49.6% of the respondents are male and 48.8% are female, while 1.6% did not provide any information regarding gender. The largest group in the sample is 30-44 years (46.4%), followed by 45-59(28.0%), 60+ (17.6%), 18-29 (6.4%), and under-18 (1.6%). Most respondents held vocational qualifications (58.4%), followed by bachelor's degrees (16.0%) and master's degrees or higher: 11.2%). A further 12.8% had a school-leaving certificate, while 1.6% reported no formal education.

3.3 Measures

The core constructs of the model were measured using validated scales from existing literature, which were adapted to the specific context of this study (Figure 2). All variables were recorded using a 5-point Likert scale (1 = 'strongly disagree' to 5 = 'strongly agree').

Table 2 Overview of Constructs, Items, and Sources

Factor	No. of Items	Description	Measurement Source(s)
Environmental Awareness (EA)	4	Assessment of participants' environment attitudes and awareness	(Dunlap et al., 2000; Saari et al., 2021; Shao & Lassleben, 2021)
Sustainability Measures (SM)	3	Perception of sustainability measures in omnichannel retailing (e.g., green shipping, packaging)	(Buldeo Rai et al., 2019; Lalchandani et al., 2024)
Shopping Experience (SE)	4	Evaluation of the overall shopping experience and satisfaction with the omnichannel retailer	(V. Lee et al., 2022; Rita et al., 2019)
Channel Integration (CI)	4	Assessment of the consistency and linkage of online and offline channels in a sustainable context	(Cao & Li, 2015; Intissar Ayachi & Rim Trabelsi El Amri, 2024; Yeğin & Ikram, 2022; Zhang et al., 2018)
Green Brand Identification (BI)	4	Emotional connection and identification with sustainability-oriented brands	(So et al., 2013)
Green Purchase Intention (GPI)	4	Purchase intention	(Konuk, 2019)

4. Results and Discussion

Data analysis using structural equation modelling (PLS-SEM) was performed with the software SmartPLS 3, following a structured multi-step approach (Al-Emran et al., 2019). First, the measurement model was evaluated to assess reliability and validity. Construct reliability was examined using Cronbach's alpha and composite reliability, while convergent validity was assessed through factor loadings and the average variance extracted (AVE). The Fornell-Larcker criterion, heterotrait-monotrait ratio (HTMT), and cross-loadings were analyzed to confirm discriminant validity. Additionally, multicollinearity was assessed using the variance inflation factor (VIF) values. The model fit was evaluated using key indices, including the standardized root mean square residual (SRMR), the normed fit index (NFI), and RMS Theta. Finally, the structural model was tested using a bootstrapping procedure with 5,000 subsamples to assess the significance of the hypothesized relationships.

4.1 Evaluation of the measurement model

The validity and reliability of the measurement model were assessed using established criteria. Factor loadings ranged from 0.685 to 0.919, indicating strong indicator reliability across all items. Cronbach's alpha

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values exceeded 0.70 for all constructs, and composite reliability (CR) values ranged from 0.815 to 0.925, demonstrating high internal consistency. Furthermore, the average variance extracted (AVE) was above the recommended threshold of 0.50 in all cases, confirming the convergent validity of the measurement scales (Table 3).

Table 3 Overview of the survey results and statistical key figures of the variables

Factor	Item	Factor Loading	Cronbach's Alpha	Composite Reliability	AVE
Environmental Awareness	I avoid products that significantly harm the environment.	0.823	0.839	0.892	0.675
	I am willing to accept longer delivery times if they are more environmentally friendly.	0.827			
	It is important to me to contribute to environmental protection through my purchases.	0.822			
	I actively seek information about the sustainability of products and companies.	0.813			
Sustainability Measures	I prefer to buy from a retailer that offers more environmentally friendly packaging.	0.914	0.879	0.925	0.806
	I prefer to buy from a retailer that offers eco-friendly delivery options (e.g., CO2-neutral delivery).	0.919			
	I inform myself about a retailer's sustainability measures before buying a product.	0.858			
Shopping Experience	I am satisfied with my shopping experience with the brand/omnichannel retailer when buying electrical goods.	0.784	0.806	0.873	0.633
	The quality of the product I buy meets my expectations.	0.767			
	I would recommend the brand/omnichannel retailer to others.	0.786			
	The brand/omnichannel retailer offered me a pleasant shopping experience.	0.842			
Channel Integration	It is important to me that Information and Linking across the online and offline channels of a retailer are consistent.	0.685	0.698	0.815	0.524
	I use different sales channels (e.g., online shop, retail store, app) and expect a seamless experience.	0.757			
	I find it convenient to research products online and purchase them in a store.	0.756			
	The ability to return a product purchased online to the store is important to me.	0.694			
Green Brand Identity	I identify with brands that promote sustainability.	0.876	0.876	0.915	0.73
	The values of a brand influence my purchasing decisions.	0.816			
	I feel emotionally connected to brands that support environmentally friendly practices.	0.833			
	Sustainable measures of a brand increase my loyalty to that brand.	0.89			
Green Purchase Intention	It is important to me to contribute to environmental protection through my purchases.	0.83	0.846	0.897	0.685
	I avoid products that significantly harm the environment.	0.831			
	My purchasing decision is strongly influenced by the sustainability of a product.	0.81			
	I actively look for sustainable products when I shop.	0.839			

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To assess discriminant validity, the Fornell-Larcker criterion and the heterotrait-monotrait ratio (HTMT) were applied. The Fornell-Larcker criterion requires that the square root of each construct's average variance extracted (AVE) exceeds its correlations with all other constructs (Fornell & Larcker, 1981). This condition was consistently fulfilled, providing support for the model's discriminant validity (Table 4).

Table 4 Discriminant validity based on the Fornell–Larcker criterion

Factor	**BI**	**CI**	**SE**	**EA**	**SM**	**GPI**
Green Brand Identity	0.854					
Channel Integration	0.368	0.724				
Shopping Experience	0.328	0.562	0.795			
Environmental Awareness	0.676	0.344	0.266	0.821		
Sustainability Measures	0.694	0.387	0.303	0.765	0.898	
Green Purchase Intention	0.727	0.365	0.251	0.628	0.667	0.827

All HTMT values were below the threshold of 0.90 (Table 5), further confirming the distinctiveness of the constructs (Henseler et al., 2015). Consistent with these results, the cross-loadings showed that each indicator loaded highest on its respective construct and substantially lower on all others, providing additional evidence of discriminant validity.

Table 5 Discriminant validity based on the HTMT criterion

Factors	**BI**	**CI**	**SE**	**EA**	**SM**	**GPI**
Green Purchase Intention						
Channel Integration	0.456					
Shopping Experience	0.377	0.745				
Environmental Awareness	0.785	0.435	0.323			
Sustainability Measures	0.788	0.491	0.356	0.886		
Green Purchase Intention	0.840	0.467	0.315	0.744	0.776	

Potential multicollinearity was assessed using variance inflation factors (VIFs). All values (Table 6) were below the critical threshold of 5, indicating no multicollinearity issues, and the stability of the model estimates can be assumed (Hair et al., 2019).

Table 6 Discriminant validity based on the VIF criterion

Key indicators	**BI**	**CI**	**SE**	**EA**	**SM**	**GPI**
Green Brand identity			2.174			1.945
Channel Integration			1.205			1.571
Shopping Experience						1.500
Environmental Awareness			2.674		1.000	1.877
Sustainability Measures			2.858			
Green Purchase Intention						

4.2 Model fit

To evaluate the model fit, several key indicators were assessed (Table 7). The Standardized Root Mean Square Residual (SRMR) was 0.099, which is within the acceptable tolerance range (threshold < 0.10). The

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RMS Theta value of 0.183 is also considered acceptable for reflective measurement models. The Normed Fit Index (NFI) reached 0.697, slightly below the conventional cutoff of 0.90. However, this relatively low value can partly be attributed to the limited sample size (n = 125), as the NFI is known to be sensitive to small samples. In the context of an exploratory pilot study with moderate model complexity, this value is therefore still regarded as acceptable.

Table 7 Model fit

SRMR	RMS Theta	Normed Fit Index (NFI)
0.099	0.183	0.697

4.3 Hypothesis testing

The structural equation modelling (SEM) yields mixed results regarding the direct and indirect effects of the variables (Table 8). The hypotheses (H1–H9) were tested using bootstrapping with 5,000 resamples. The path coefficients were examined for their statistical significance. While three hypotheses were confirmed, six showed no significant correlation. Table 8 summarizes the results of the hypothesis testing, including the standardized path coefficients, standard deviations, t-statistics, and p-values indicating the significance of the relationships between the latent constructs.

Table 8 Results of the hypothesis test

Hypothesis		Original Sample	Sample Mean	SD	T Statistics	P Values
H1	Environmental Awareness -> Sustainability Measures	0.765	0.765	0.047	16.186	**0.000**
H2	Environmental Awareness -> Shopping Experience	-0.023	-0.011	0.168	0.139	**0.889**
H3	Environmental Awareness -> Green Purchase Intention	0.236	0.239	0.128	1.847	**0.065**
H4	Shopping Experience -> Green Purchase Intention	-0.054	-0.058	0.084	0.646	**0.518**
H5	Sustainability Measures -> Shopping Experience	0.029	0.022	0.157	0.183	**0.855**
H6	Channel Integration -> Shopping Experience	0.509	0.508	0.085	6.012	**0.000**
H7	Channel Integration -> Green Purchase Intention	0.114	0.118	0.092	1.237	**0.216**
H8	Green Brand Identity -> Green Purchase Intention	0.543	0.541	0.093	5.827	**0.000**
H9	Green Brand Identity -> Shopping Experience	0.137	0.134	0.121	1.138	**0.255**

Significant direct effects were found for brand identification on green purchase intention (H8: p = 0.000), environmental awareness on sustainability measures (H1: p = 0.000), and channel integration on shopping experience (H6: p = 0.000). No significant effects on green purchase intention were observed from environmental awareness (H3), channel integration (H7), or shopping experience (H4). Similarly, brand identification on shopping experience (H9), environmental awareness on shopping experience (H2), and sustainability measures on shopping experience (H5) did no show significant effects. Indirect effects, such as those mediated by shopping experience were not supported.

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5. Conclusions and Contribution

This pilot study aimed to develop and empirically test an integrated structural equation model in omnichannel consumer electronics retail. The model systematically captures the influence of individual (environmental awareness, shopping experience) and organizational factors (channel integration, sustainability measures, brand identification) on consumer behavior and the green purchase intention. Based on theoretically derived hypotheses, the model was first fully specified and then refined by eliminating insignificant paths to optimize model quality.

The results present a nuanced and multidimensional picture. Among all examined variables, brand identification emerged as the strongest predictor of consumers' green purchase intention. While environmental awareness is strongly related to the perception of sustainability measures, it does not exert a statistically significant direct effect on green purchase intention. In contrast, consumers' identification with brands that credibly convey sustainable values plays a substantial role in shaping purchasing decisions. By contrast, the analysis revealed no significant direct effects of environmental awareness (H3), channel integration (H7), sustainability measures (H5), or shopping experience (H4) on green purchase intention. Likewise, brand identification (H9) and environmental awareness (H2) did not significantly influence the shopping experience. The bootstrap analysisdid not provide evidence for any indirect effects, either. These findings suggest that sustainable purchase decisions are driven less by functional or technical aspects of the retail experience and more by value-based factors – such as identification with sustainability-oriented brands. Although channel integration significantly contributes to the shopping experience (H6), it does not directly impact green purchase intention. This underlines the importance of cross-channel consistency for enhancing the customer experience, while also indicating that such structural features alone are insufficient to promote sustainable consumption behavior.

Overall, the structural equation model provides an initial empirical framework for analyzing sustainability-related factors in omnichannel retail for consumer electronics and offers valuable implications for further research. On a theoretical level, the study expands the discussion on sustainable consumption by integrating individual and organizational factors into a single model and transferring concepts from other industries to the comparatively under-researched consumer electronics industry. It extends existing models of consumer decision-making and highlights the differentiated role of both significant and insignificant paths in understanding purchase intention. From a practical perspective, the findings highlight that environmental awareness and brand identity are central drivers of green purchase intention and emphasizes the importance of a credible and consistent brand positioning regarding sustainable values. Omnichannel retailers in the consumer electronics sector should implement initiatives such as transparent supply chains, eco-friendly shipping, and take-back systems for old appliances, and communicate these consistently across all channels. Although channel integration did not directly affect green purchase intentions, its strong link to the shopping experience indicates that a seamless connection of channels remains essential. The results also show that sustainability measures are only effective when aligned with consumers' environmental attitudes and meaningfully integrated into the purchasing process.

6. Limitations

Despite its relevant findings, this pilot study has several limitations. With a sample size of only 125 subjects, the study's statistical significance and generalizability are limited. The small sample may distort results and reduce the stability of the estimated parameters in the structural equation model. Furthermore, the survey was conducted exclusively in Germany, which restricts the transferability of the results to other countries or cultural contexts. However, Germany is Europe's largest market for consumer electronics and has a high rate of online penetration, . making it a meaningful setting for an exploratory study – though the findings

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should still be interpreted in a national context. Different cultural and economic contexts can significantly influence consumer behavior.

As a pilot study, the primary aim was to test methods and identify challenges for future large-scale research. Its exploratory nature is valuable in that it highlights both significant and non-significant relationships, thereby refining the conceptual framework before applying it to larger and more diverse samples. Therefore, the results should be interpreted with caution, particularly given the limited sample size. Additionally, the study relied on a non-probabilistic, panel-based sampling method that is functionally similar to convenience sampling. This approach means that not every consumer in Germany had an equal chance to be selected As a result, the findings cannot be generalized to all omnichannel electronics consumers but apply only to the surveyed consumer group. Future research should build on this framework using a larger, more diverse sample to examine the impact of sustainability on consumer behavior in omnichannel electronics retail, which the authors intend to pursue in subsequent studies.

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