Consumer Purchase Intentions in Green Marketing: The Role of Relational Bonds on E-Commerce Platforms

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Abstract

E-commerce platforms increasingly rely on green marketing not only to differentiate themselves but also to respond to the rising consumer demand for sustainable products. This study examines the green marketing practices of Taiwan's e-commerce platforms, focusing on how platforms design product portfolios and relational strategies to promote green consumption. Specifically, we investigate the effects of relational bonds on consumers' purchase intentions toward green products marketed on e-commerce platforms, as well as the moderating roles of relationship quality, marketing communication effect, and consumers' environmental knowledge. The results reveal that relational bonds positively affect purchase intentions. Moreover, relationship quality, marketing communication effect, and environmental knowledge positively moderate this relationship. These findings extend the literature on relational bonds by clarifying their mechanisms in green marketing and contribute to research by shifting the focus from developed markets and manufacturing industries to emerging markets and e-commerce service providers. From a managerial perspective, the study suggests that e-commerce platforms should strengthen relational bonds to promote green purchase intentions, while simultaneously enhancing relationship quality and consumers' environmental knowledge, design product portfolios that visibly signal environmental responsibility, and employ effective marketing communication to clearly convey their green values to consumers. For international and emerging market contexts, the results highlight the importance of developing sustainable business models that align with consumer demand and platform strategies to drive green consumption.

Keywords: E-Commerce, Green Marketing, Relational Bonds, Consumer Purchase Intentions.

JEL Classifications: M31, M14, D91

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1. Introduction

The increasing severity of climate change has led governments, enterprises, and consumers globally to emphasize environmental sustainability (Borah et al., 2023; Shehawy and Khan, 2024). Enterprises often demonstrate environmental awareness through their products or adopt carbon reduction measures in the production process to attract environmentally conscious consumers (Alamsyah et al., 2020; White et al., 2025). This use of environmentally friendly production practices is the foundation of green marketing (Borah et al., 2023; Papadas et al., 2017; White et al., 2025).

At the same time, consumers have shown rising demand for green products across global markets. In emerging economies, social and knowledge values significantly shape interest in sustainable consumption despite consumers' price sensitivity (Biswas and Roy, 2015). Beyond emerging markets, green consumption is increasingly recognized as a social phenomenon, encompassing diverse consumer groups from highly committed greens to reluctant adopters (Lee and Haley, 2022). Younger and more educated consumers, in particular, are more willing to pay a premium for eco-friendly products (Mehraj et al., 2023). Other studies have highlighted that consumers' environmental knowledge and awareness are closely associated with their concern for sustainability and their interest in green products, underscoring the importance of consumer demand in shaping green purchase intentions (Aman et al., 2012; Amoako et al., 2020; Wang et al., 2020).

In addition to consumer demand, e-commerce platforms play a strategic role in promoting green consumption. Through green marketing, platforms present product portfolios that show they can meet consumer demand for sustainable products. By highlighting eco-friendly brands and categories, platforms strengthen consumer trust and confidence (Chen and Chang, 2013; Awan and Almurad, 2024). Prior research also shows that relational strategies, such as loyalty programs and interactive services, further enhance satisfaction and purchase intentions (Yi et al., 2021; Chang et al., 2019). With the growth of green e-commerce, platforms are increasingly recognized as intermediaries that connect consumer demand with sustainable purchasing behaviors (Keserwani and Rastogi, 2021).

Building on the above discussion, the demonstrated importance of corporate green marketing efforts, the rise of consumer demand for sustainable products, and the strategic role of e-commerce platforms in shaping green product portfolios collectively underscore that examining green marketing in the context of e-commerce platforms is both timely and valuable. However, prior research remains limited and reveals several important gaps.

First, research on the antecedents of green consumption is limited, and environmentally friendly products do not always guarantee increased purchase intentions. Prior studies suggest that consumer misunderstanding, confusion, or perceived risks may undermine the effectiveness of green products (Chen and Chang, 2013; Shehawy and Khan, 2024), while high prices and limited knowledge can further discourage purchases (Indriani et al, 2019; Islam and Khan, 2024; Yang et al., 2024). In addition, much of the literature emphasizes product-related elements—such as logistics, green labels, eco-branding, and green production technologies—rather than relational and psychological

mechanisms that may also drive purchase intentions (Awan and Almurad, 2024; Huang et al., 2024; Raj et al., 2023; Sun and Wang, 2020).

Second, the moderating effects of firm and consumer factors have not been comprehensively examined. Prior research tends to focus on either consumer attributes, such as environmental knowledge and attitudes (Norazah, 2013; Aman et al., 2012), or firm-level strategies, such as certifications and communication practices (Mohamed and Mahmoud, 2022; Papadas et al., 2017), but rarely their joint influence. Given the complexity of green marketing, it is critical to evaluate how firm-related and consumer-related moderators interact to shape marketing effectiveness (Amoako et al., 2020; Shehawy, 2023; Sun and Wang, 2020).

Third, although green products and services have been widely studied in physical contexts, relatively few studies have extended this discussion to digital environments, despite the dominance of e-commerce in contemporary consumption (Ikhsan etal., 2024; Keserwani and Rastogi, 2021; Shihab et al., 2025). Unlike traditional firms, e-commerce platforms lack direct control over production technologies, yet they exert influence through product curation and relationship-building mechanisms (Chang et al., 2019; Zhang et al., 2016). This underscores the need to investigate how platforms implement green marketing strategies to meet sustainability goals.

To address these gaps, the objective of this study is to examine how relational bonds developed by e-commerce platforms influence consumers' green purchase intentions, and how this relationship varies depending on relationship quality, marketing communication effect, and consumers' environmental knowledge. Building on this objective, the study develops a green marketing model tailored to e-commerce platforms that influence green consumption primarily through relational strategies rather than direct control over product sustainability attributes. The model examines relational bonds as key antecedents of green purchase intentions and evaluates the moderating roles of firm- and consumer-related factors. In doing so, the study clarifies the mechanisms underlying green purchase intentions and offers managerial insights for e-commerce platforms seeking to strengthen their green marketing strategies. Guided by this framework, the study addresses three research questions: (1) What is the impact of relational bonds on consumers' green product purchase intentions? (2) To what extent do firm–consumer relationship quality, firm marketing communication effect, and consumer environmental knowledge influence the association between relational bonds and green purchase intentions? (3) What green marketing strategies can e-commerce platforms implement through relational bonds? Using a quantitative survey approach, this study deepens our understanding of relational bonds by considering the heterogeneity of consumers and e-commerce contexts and offers practical recommendations for sustainable marketing on digital platforms.

2. Literature Review and Hypotheses Development

2.1 Green Marketing and Green Products

Green marketing refers to the integration of environmental considerations into marketing strategies—including product design, pricing, promotion, and distribution—with the aim of creating

value for both consumers and society while reducing environmental impact (Peattie and Crane, 2005; Papadas et al., 2017). Similarly, green products are defined as goods that minimize negative environmental effects throughout their life cycle, from raw material selection and production to consumption and disposal (Ottman, 2011; Chen and Chang, 2013). As a global phenomenon, green marketing has become increasingly relevant due to rising environmental concerns and consumer awareness (Borah et al., 2023; Papadas et al., 2019; White et al., 2025). It can enhance brand image and attract environmentally conscious consumers (Ismail et al., 2023; Shehawy and Khan, 2024), but its effectiveness is sometimes constrained by higher product prices (Mehraj and Qureshi, 2020) and limited consumer knowledge (Barber et al., 2009; Chen, 2019; Huang et al., 2024). Thus, while green marketing improves firms' environmental performance, it does not always translate into higher purchase intentions or profits (Alamsyah et al., 2020; Sun and Wang, 2020). Much of the literature has emphasized product-related elements—such as the 4Ps, green technology, and logistics (Awan and Almurad, 2024; Raj et al., 2024; Gustavo et al., 2021)—but scholars have increasingly called for broader investigations of additional determinants and moderating factors (Islam and Khan, 2024; Shehawy, 2023; Shehawy and Khan, 2024; Yang et al., 2024).

2.2 Relational Bonds

Relationship marketing emphasizes building long-term, mutually beneficial exchanges between firms and customers (Berry, 1983; Berry and Parasuraman, 1991). Relational bonds—financial, social, and structural—are central to this process (Berry, 1995; Grönroos, 1997). Financial bonds offer monetary incentives, such as discounts or price promotions, which are particularly relevant in offsetting the higher costs of green products (Chen and Chiu, 2009; Ahmad and Zhang, 2020). Social bonds are formed through personalized interactions that increase trust and familiarity with green products, thereby mitigating skepticism regarding greenwashing (Chen and Chang, 2013; de Freitas Netto et al., 2020). Structural bonds provide unique benefits, such as loyalty programs or exclusive services, that raise switching costs and encourage long-term relationships (Hennig-Thurau et al., 2002; Zhang et al., 2016). Prior research suggests that these relational bonds increase satisfaction and purchase intentions (Chang et al., 2019; Mai et al., 2021; Sweeney and Soutar, 2001). Accordingly, we hypothesize:

H1: Relational bonds established by e-commerce platforms selling green products positively affect consumers' purchase intentions.

H1a: Financial bonds positively affect purchase intentions.

H1b: Social bonds positively affect purchase intentions.

H1c: Structural bonds positively affect purchase intentions.

2.3 Relationship Quality

Relationship quality captures key dimensions such as trust, commitment, and satisfaction in long-term customer–firm interactions (Dwyer et al., 1987; Crosby et al., 1990; Keating et al., 2003).

High relationship quality strengthens the effectiveness of relational bonds by enhancing consumer confidence and loyalty (Athanasopoulou, 2009; Zhang et al., 2016). In e-commerce settings, where transactions rely primarily on platform-mediated interactions rather than face-to-face contact, relationship quality serves as an important basis for consumers to evaluate the credibility of the platform. When relationship quality is high, relational bonds are more likely to be perceived as credible and value-enhancing, thereby strengthening their effect on consumers' green purchase intentions. Accordingly, strong relationship quality enhances the effectiveness of relationship marketing strategies by reducing perceived uncertainty and reinforcing consumers' confidence in the relationship. Thus, we hypothesize:

H2: Relationship quality positively moderates the effect of relational bonds on purchase intentions for green products marketed on e-commerce platforms.

2.4 Marketing Communication Effect

Effective marketing communication—through advertising, sales promotion, events, online media, or public relations—conveys the advantages of firms' products and enhances brand image (Kotler and Armstrong, 2010; Schultz and Schultz, 2004). Strong communication strategies reduce consumer uncertainty and stimulate purchase intentions (Doddaraju and Narayanareddy, 2013; Opoku et al., 2014). In the context of e-commerce platforms, marketing communication functions as an informational mechanism that makes platform-based relational strategies and green-related messages more visible and interpretable to consumers. By enhancing the salience and clarity of relational cues, effective marketing communication enables consumers to recognize and understand the value embedded in relational bonds offered by the platform. Accordingly, when marketing communication is perceived as more effective, the influence of relational bonds on green purchase intentions is expected to be stronger. Therefore, we hypothesize:

H3: Marketing communication effect positively moderates the effect of relational bonds on purchase intentions for green products marketed on e-commerce platforms.

2.5 Environmental Knowledge

Environmental knowledge reflects individuals' awareness of environmental issues and responsibility toward sustainable behavior (Mostafa, 2007; Indriani et al., 2019). Consumers with greater environmental knowledge are more willing to purchase green products despite higher prices (Aman et al, 2012; Norazah, 2013). In digital contexts, environmental knowledge also shapes how consumers process and interpret green-related information conveyed by e-commerce platforms. Consumers with higher environmental knowledge are better able to evaluate green claims and marketing cues, which in turn strengthens the effectiveness of firms' green marketing efforts (Alamsyah et al., 2020; Wang et al., 2020). As relational bonds on e-commerce platforms function as relational cues that signal value creation and commitment, consumers with higher environmental knowledge are more capable of recognizing and interpreting the green significance embedded in these relational strategies. Consequently, the influence of relational bonds on green purchase intentions is

expected to be stronger among consumers with higher environmental knowledge. Thus, we hypothesize:

H4: Environmental knowledge positively moderates the effect of relational bonds on purchase intentions for green products marketed on e-commerce platforms.

Based on the above discussion, this study develops a conceptual framework that integrates the antecedents, moderators, and consequences of green marketing in the e-commerce context. Specifically, the framework proposes that relational bonds—financial, social, and structural—serve as key antecedents influencing consumers' green purchase intentions. Furthermore, the framework considers three moderators that may strengthen these effects: relationship quality, marketing communication effectiveness, and consumer environmental knowledge. Together, these components capture both firm-driven and consumer-related mechanisms that shape the effectiveness of green marketing strategies on e-commerce platforms.

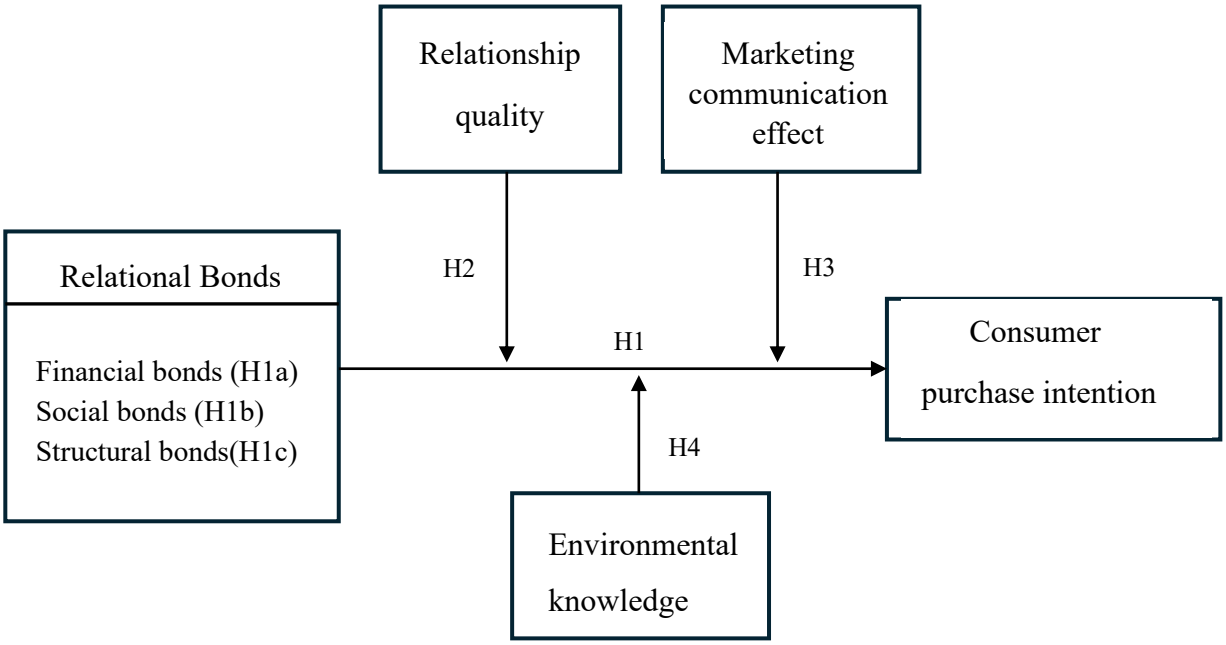

Figure 1. Research Framework

As illustrated in Figure 1, the proposed framework explains how e-commerce platforms can enhance consumers' purchase intentions for green products by leveraging relational bonds. The inclusion of moderators highlights that these effects are not uniform but vary depending on the quality of the consumer–platform relationship, the effectiveness of marketing communication, and consumers' environmental knowledge. This framework therefore provides a comprehensive basis for testing the hypotheses developed in this study.

3. Method

3.1 Scale Development

To ensure content validity, all constructs in this study were measured using multi-item scales adapted from established literature. The questionnaire consisted of two major sections: (a) demographic information and (b) measures of the study constructs. Specifically, relational bonds were operationalized into three sub-dimensions: financial, social, and structural bonds, each measured with four items adapted from Berry (1995), Berry and Parasuraman (1991), Chen and Chiu (2009), and Alagarsamy et al. (2021). Relationship quality was measured with items adapted from Crosby et al. (1990), Keating et al. (2003), and Zhang et al. (2016), capturing trust, satisfaction, and commitment. Marketing communication effectiveness was measured with items derived from Kotler and Armstrong (2010), Frimpong (2014), and Opoku et al. (2014), focusing on clarity, persuasiveness, and informativeness. Environmental knowledge was measured using items from Aman et al. (2012), Wang et al. (2020), and Norazah (2013), emphasizing consumers' understanding of environmental issues and their influence on purchasing decisions. Finally, purchase intention was measured with five items adapted from Chang and Wildt (1994) and Sweeney and Soutar (2001), which reflect consumers' willingness to purchase green products on e-commerce platforms. All items were rated on a five-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"). A pilot test with a small sample of respondents was conducted to refine wording and ensure clarity. Reliability was tested using Cronbach's α, and factor analysis was conducted to confirm the dimensionality of the constructs. Table 1 presents the conceptual definitions of the constructs and their corresponding operational measurements, along with measurement sources. The detailed measurement items are provided in Appendix A.

Table 1. Conceptual Definitions and Operational Measurements

Concept	Construct	Operational Measurement	Measurement Sources
Relational Bonds	Financial bonds	Customers can obtain discounted prices or special offers through the relationship.	Alagarsamy et al. (2021); Berry (1995); Berry and Parasuraman (1991); Chen and Chiu (2009); Lovelock (1994); Mai et al. (2021); Sweeney and Soutar (2001)
	Social bonds	Customers can experience friendship, closeness, and personalized services.	
	Structural bonds	Customers can obtain added value and services not easily available elsewhere.	
Relationship Quality	-	Consumers' overall satisfaction with interactions in the business relationship.	Crosby et al. (1990); Keating et al. (2003); Zhang et al. (2016)
Marketing Communication Effect	-	Consumers' perceptions of marketing communication mix, such as advertising, PR, promotion, and direct marketing.	Kotler and Armstrong (2010); Frimpong (2014); Opoku et al. (2014)
Environmental Knowledge	-	Consumers' understanding of environmental improvement and ecological maintenance.	Aman et al. (2012); Wang et al. (2020); Norazah (2013)
Purchase Intention	-	Consumers are willing to purchase or recommend products to other consumers.	Consumers are willing to purchase or recommend products to other consumers.

3.2 Data Collection and Samples

The target population of this study was explicitly defined as consumers in Taiwan who had prior experience purchasing green products through e-commerce platforms. This ensured that respondents were familiar with the study context. A purposive sampling strategy was employed.

Data were collected through an online questionnaire administered via SurveyCake between mid-March and early April 2023. Participants were recruited through links distributed via social media platforms, e-commerce-related communities, and consumer discussion forums. A total of 369 questionnaires were collected. After excluding invalid responses from participants without e-commerce platform accounts or without prior e-commerce purchasing experience, as well as incomplete responses with excessive missing values, 330 valid questionnaires were retained, yielding an effective response rate of 89.4%.

3.3 Data Analysis

Data analysis was conducted using SPSS 20.0. Descriptive statistics were first computed to summarize the demographic characteristics of the sample. To ensure measurement quality, reliability was assessed using Cronbach's α, and factor analysis was conducted to confirm the dimensionality of the constructs.

Hypothesis testing was performed through regression analysis and group comparison techniques. Specifically, multiple regression was employed to examine the direct effects of financial, social, and structural bonds on green purchase intentions (H1a–H1c). For the moderating effects (H2–H4), the study adopted the extreme group method (27% rule). Following Kelley (1939), respondents were ranked based on their scores on the moderating variables, and the highest 27% and lowest 27% were classified into high and low groups, respectively. Independent sample t-tests were then applied to compare purchase intentions between these groups. This procedure allowed us to assess whether relationship quality, marketing communication, and environmental knowledge moderated the associations between relational bonds and purchase intentions.

4. Results

This section presents the empirical results of the study. We first report the descriptive statistics of the sample, followed by the hypothesis testing results and the analysis of moderating effects.

4.1 Descriptive statistics

4.1.1 Sample structure

In total, 69.6% (230) and 30.4% (100) of the respondents were women and men, respectively. Most respondents were between 16 and 30 years old (260, 78.5%), and most had a college education (232, 70.3%). Most were students (180, 54.5%). Finally, most respondents had a monthly income between US$650 and US$1,500 (242, 73.3%).

4.1.2 Factor analysis

To verify that the items on the questionnaire reflected the seven factors investigated in this study, we subjected the results to a factor analysis. Items with factor loadings less than 0.4 were deleted because the correlation between the items and the factors was low. Subsequently, the questionnaire items were classified across seven component factors.

4.1.3 Reliability and validity analysis

Because this study collected all data using a single questionnaire, we tested for potential common method bias (Jakobsen and Jensen, 2015; Woszczynski and Whitman, 2004). This study employed Harman's single-factor test to examine the items used, extracting factors with eigenvalues greater than 1 (Podsakoff and Organ, 1986). The results revealed that in the unrotated factor solution, the first factor accounted for only 30.373% of the variance, below the threshold of 50%, indicating that common method bias was not a concern.

The Cronbach's α values for all constructs exceeded the recommended threshold of 0.7, indicating satisfactory internal consistency (Dijkstra and Henseler, 2015). In addition, convergent validity was supported, as the standardized factor loadings of all items exceeded 0.4, a commonly used criterion in factor analysis, indicating adequate convergence among indicators within each construct.

Table 2. Cronbach's α of each construct

Constructs	Cronbach's α
Financial bonds	.757
Social bonds	.815
Structural bonds	.807
Purchase intention	.919
Relationship quality	.908
Environmental knowledge	.923
Marketing Communication Effect	.794

4.2 Hypothesis Testing / Main Effects

The results of the data analysis of the questionnaire presented in Table 3 reveal that the adjusted R2 value was 0.276, indicating that the regression model explained 27.6% of the observed variance; the standardized coefficient was (β = 0.527), the P value was positive and significant (P = 0.000). Hence, the green marketing of e-commerce platforms through relational bonds positively and significantly influenced consumers' purchase intentions. Therefore, H1 was supported.

Table 3. Regression of Overall Relational Bonds and Purchase Intentions

Independent variable	Dependent variables	Unstandardized coefficient		Standardization beta	t-value	Significance	AdjustedR^2
		β estimate	Standard error				
Relational Bonds	Purchase intention	.676	.060	.527	11.237	.000	.276

We also determined which of the three relational bonds was most influential on purchase intentions. The model for financial bonds (H1a) (Table 4) had an adjusted R^2 value of 0.150,

indicating that the model explained 15% of the observed variance; the standardized coefficient of financial bonds (β = 0.109) was positive, and the effect was close to statistical significance (p = 0.054). Thus, the results provide marginal support for H1a.The model for social bonds had an adjusted R2 value of 0.175, indicating that the model explained 17.5% of the observed variance; the standardized coefficient of social bonds (β = 0.070) was positive, and P = 0.177. Because P > 0.05, social bonds positively affected purchase intentions, but the effect was nonsignificant. Therefore, H1b was not supported. The model for structural bonds (Table 4) had an adjusted R2 value of 0.311, indicating that the model explained 31.1% of the observed variance; the standardized coefficient of structural bonds (β = 0.461) was positive, and P = 0.000. Therefore, structural bonds positively and significantly affected purchase intentions, and H1c was supported.

Table 4. Regression of Each Relational Bond and Purchase Intentions

Independent variable	Dependent variable	Unstandardized coefficient		Standardization beta	t-value	Significance	AdjustedR2
		β estimate	Standard error				
Financial bonds	Purchase intentions	.100	.052	.109	1.938	.054	.311
Social bonds		.071	.052	.070	1.354	.177	
Structural bonds		.511	.063	.461	8.094	.000	

4.3 Moderating Effects

4.3.1 Moderating Effect of Relationship Quality

To examine the moderating effect of relationship quality, respondents were divided into high and low groups based on the extreme group approach, using the highest and lowest 27% of relationship quality scores. An independent sample t-test was conducted to compare purchase intentions between the two groups, and the results are presented in Table 5.

The results indicate that consumers with high relationship quality reported significantly higher purchase intentions (M = 4.226, SD = 0.576) than those with low relationship quality (M = 3.393, SD = 0.582). Levene's test showed no violation of the assumption of homogeneity of variances (F = 0.020, p = 0.888). The t-test results further revealed a statistically significant difference between the two groups (t = 9.834, p < 0.001). These findings indicate that relationship quality positively moderates the effect of green marketing on purchase intentions. Therefore, H2 was supported.

Table 5. Independent Sample t-Test for Relationship Quality

	High-Low	N	Mean	Standard Deviation	Levene's Test		t value	Significance
					F	Significance		
Relationship Quality	High	110	4.226	.576	.020	.888	9.834	.000
	Low	81	3.393	.582				

4.3.2 Moderating Effect of Marketing Communication Effect

To test the moderating role of marketing communication effect, respondents were similarly categorized into high and low groups using the same extreme group method. The results of the independent sample t-test are reported in Table 6.

The findings show that consumers in the high marketing communication effect group exhibited significantly higher purchase intentions (M = 4.194, SD = 0.492) than those in the low marketing communication effect group (M = 3.540, SD = 0.626). Levene's test indicated a significant difference in variances between the two groups (F = 6.319, p = 0.013); therefore, the t-test results under unequal variance assumptions were considered. The t-test results confirmed a statistically significant difference between the two groups (t = 9.217, p < 0.001). These results suggest that marketing communication effect positively moderates the relationship between green marketing and purchase intentions. Accordingly, H3 was supported.

Table 6. Independent Sample t-Test for Marketing Communication Effect

	High-Low	N	Mean	Standard deviation	Levene's test		t value	Significance
					F	Significance		
Marketing communication effect	High	130	4.194	.492	6.319	.013	9.217	.000
	Low	120	3.540	.626				

4.3.3 Moderating Effect of Environmental Knowledge

To examine the moderating effect of environmental knowledge, respondents were divided into high and low environmental knowledge groups using the same procedure. The results of the independent sample t-test are presented in Table 7.

The results reveal that consumers with high environmental knowledge reported significantly higher purchase intentions (M = 4.3378, SD = 0.5242) than those with low environmental knowledge (M = 3.4043, SD = 0.5539). Levene's test indicated no significant violation of homogeneity of variances (F = 0.224, p = 0.637). The t-test results further showed a statistically significant difference between the two groups (t = 11.672, p < 0.001). This finding suggests that environmental knowledge positively moderates the effect of green marketing on purchase intentions. Therefore, H4 was supported.

Table 7. Independent Sample t-Test for Environmental Knowledge

	High-Low	N	Mean	Standard deviation	Levene's test		t value	Significance
					F	Significance		
Environmental knowledge	High	90	4.338	.524	.224	.637	11.672	.000
	Low	92	3.404	.554				

5. Discussion

This study developed a framework to explore the influence of relational bonds on consumers' green purchase intentions on e-commerce platforms. The findings demonstrate that relational bonds are a key factor influencing purchase intentions.

5.1 Summary of finding

This study provides several important findings regarding the role of relational bonds in promoting green purchase intentions on e-commerce platforms. First, the results show that overall relational bonds positively and significantly influence consumers' purchase intentions (supporting

H1). When examining the three types of relational bonds—financial, social, and structural—the results indicate that financial bonds (H1a) have a positive effect with marginal support, social bonds (H1b) show a positive but nonsignificant effect, whereas structural bonds (H1c) positively and significantly influence consumers' purchase intentions. The findings related to H1a and H1c are generally consistent with prior studies suggesting that relationship marketing strategies create additional value, thereby strengthening consumers' willingness to purchase (Berry and Parasuraman, 1991; Crosby et al., 2009; Chang et al., 2019; Alagarsamy et al., 2021). However, H1b was not supported, suggesting that social bonds do not directly enhance green purchase intentions in this context. This may be attributed to the low social presence inherent in e-commerce interfaces, where a lack of interpersonal cues limits the platform's ability to foster deep emotional social bonds (Gefen and Straub, 2004). Unlike physical stores, the digital environment's lower media richness makes it difficult for consumers to perceive the warmth of social interactions.

Second, the moderating variables further clarify the boundary conditions of these effects. Relationship quality (H2) significantly strengthens the association between relational bonds and green purchase intentions, consistent with prior research emphasizing the roles of trust and relationship strength (Athanasopoulou, 2009). Marketing communication effect (H3) also positively moderates this relationship, suggesting that effective marketing communication enhances the salience and clarity of relational signals conveyed by e-commerce platforms, as discussed in the literature on marketing communication and relationship marketing (Kotler and Armstrong, 2010; Frimpong, 2014). Environmental knowledge (H4) further strengthens this association, highlighting the importance of consumers' ability to process environmental information in green purchase decisions (Aman et al., 2012; Wang et al., 2020). Together, these findings highlight that both firm-level relational strategies and consumer-level characteristics jointly shape the effectiveness of green marketing in digital platforms (Papadas et al., 2017; Sun and Wang, 2020).

5.2 Theoretical implications

This study makes several theoretical contributions by addressing three important research gaps in the green marketing literature.

First, the study broadens the understanding of the antecedents of green purchase intentions. Earlier research has often emphasized product-related factors such as eco-labels, technologies, and the green marketing mix (Papadas et al., 2019; Sun and Wang, 2020). While these factors highlight environmental attributes, they insufficiently explain how consumers build long-term trust and commitment to green purchasing. Our findings demonstrate that relational bonds, as an overall relational strategy, represent an important driver of purchase intentions in the e-commerce context. When disentangling the three dimensions, structural bonds emerge as the most robust predictor, financial bonds show marginal support, whereas social bonds do not exhibit a statistically significant effect. This pattern may reflect a key difference between online and offline contexts. Compared with offline exchanges, online shopping environments often provide fewer interpersonal cues and relatively lower levels of interpersonal interaction, which may constrain the effectiveness of socially

oriented relational bonds (Gefen and Straub, 2004; Xu et al., 2022; Zhao et al., 2023; Cui et al., 2022). In the e-commerce platform context examined in this study, the results suggest that relationship-based strategies can create value beyond product attributes mainly through structural mechanisms, while financial incentives may play a more contingent role in reinforcing consumers' trust and loyalty (Berry, 1995; Chen and Chiu, 2009; Alagarsamy et al., 2021). Moreover, these results mirror the growing consumer demand for green products, indicating that relational strategies are increasingly necessary to complement product-level innovations and to meet shifting consumer expectations in digital marketplaces (Biswas and Roy, 2015; Lee and Haley, 2022; Mehraj et al., 2023).

Second, the study advances research on the moderating factors that shape green marketing effectiveness. Previous studies have tended to examine either firm-level or consumer-level influences in isolation (Crosby et al., 1990; Zhang et al., 2016). By contrast, this study integrates both perspectives by demonstrating that relationship quality (H2), marketing communication effect (H3), and environmental knowledge (H4) strengthen the impact of relational bonds on green purchase intentions. Specifically, relationship quality enhances the effectiveness of relational bonds by reinforcing trust between e-commerce platforms and consumers. Marketing communication effect then plays a complementary role by increasing the visibility and clarity of relational cues conveyed by e-commerce platforms, thereby facilitating consumers' understanding of these relational signals. Environmental knowledge further strengthens this relationship by improving consumers' ability to process and evaluate environmental information. In this regard, marketing communication serves as a facilitating condition that amplifies, rather than undermines, the influence of relational bonds, consistent with prior research emphasizing the role of communication in supporting relationship marketing strategies (Crosby et al., 1990).

Finally, the study contributes to the e-commerce context of green marketing, which remains relatively underexplored compared with offline retail. Digital platforms differ from traditional markets in how they curate products, build trust, and engage consumers (Keserwani and Rastogi, 2021; Shihab et al., 2025; Jain et al., 2021). By situating relational bonds and moderating mechanisms within this context, our findings extend the applicability of green marketing theory to digital commerce. Importantly, the results emphasize that e-commerce platforms employ green marketing as part of their product portfolio strategies, signaling to consumers that sustainability demands are being addressed through curated assortments, loyalty programs, and exclusive services (Chen and Chang, 2013; Yi et al., 2021). This perspective highlights the role of intermediaries, not just producers, in shaping sustainable consumption patterns, enriching the theoretical conversation by linking green marketing with platform strategy.

Collectively, these contributions integrate green marketing and relationship marketing within the digital commerce context, providing a more comprehensive framework for understanding how relational strategies, consumer demand, and platform initiatives jointly foster sustainable consumption.

5.3 Managerial implications

E-commerce platforms face constraints that are distinct from those of green product manufacturers. First, e-commerce platforms have no direct control over the green products sold on their platforms and instead focus on providing sales and support services. Hence, such platforms function as a facilitator between the merchant and customer. However, research on green products offers limited practical guidance for supporting green merchants on e-commerce platforms. This study highlights the role of relational bonds in encouraging consumers to purchase through e-commerce platforms, complementing the green marketing efforts of manufacturers or brands. Specifically, this study suggests that financial bonds (e.g., price discounts) and structural bonds (e.g., membership benefits) offered by platforms can motivate purchase intentions by providing membership benefits centered on value cocreation. For example, e-commerce platforms can incentivize members to share their experiences with or opinions on green products. From a value cocreation perspective, such strategies can enhance the relational connection between consumers and the platform, increasing their likelihood of making a purchase.

These relational strategies are particularly relevant in the context of rising consumer demand for green products. To meet this demand, e-commerce platforms can strengthen their role not only by supporting green merchants but also by designing product portfolios that signal environmental responsibility. Aligning such portfolios with relational incentives enables platforms to satisfy consumer expectations while differentiating themselves in competitive digital markets, consistent with evidence from brick-and-mortar retail settings showing that green marketing alternatives can reduce waste and enhance sustainability performance (Gustavo et al., 2021).

This study also identifies three factors that e-commerce platforms can manipulate to enhance the effectiveness of relational bonds. First, e-commerce platforms can improve relationship quality by focusing on the shopping experience, fostering meaningful interactions, and maintaining a positive corporate reputation. Second, the findings indicate that marketing communication effect positively moderates the relationship between relational bonds and purchase intentions. This suggests that effective marketing communication can enhance the visibility and clarity of relational signals conveyed by platforms, thereby reinforcing consumers' understanding of green offerings and strengthening the influence of relational bonds. Accordingly, e-commerce platforms should focus on delivering clear, consistent, and credible communication to support their relational strategies and green marketing initiatives. Third, using consumers' environmental knowledge as a variable for market segmentation facilitates the creation of differentiated marketing strategies. By employing these three actionable strategies, e-commerce platforms can enhance consumer acceptance of green marketing initiatives, strengthening the influence of relational bonds on green consumption.

This study also provides recommendations for international companies entering emerging markets where environmental sustainability is prized. For example, in Taiwan, numerous manufacturing enterprises that play critical roles in the international supply chain are deeply concerned regarding environmental protection, investing in green supply chains, renewable energy,

responsible consumption, and sustainable production. A similar trend is observable in Taiwan's service industry, especially e-commerce providers. This study suggests that international brands selling green products can adopt a business model of cooperating with e-commerce platforms to successfully enter emerging markets.

5.4 Policy recommendations

This study proposes several policy recommendations to increase green consumption. First, referencing the United Nations' Sustainable Development Goal (SDG) 12—Responsible Consumption and Production—policymakers should recognize the role of e-commerce platforms in promoting green consumption. Because of the prevalence of e-commerce in Taiwan, policymakers can introduce incentives, such as awards or subsidies, to encourage e-commerce platforms to sell green products. Additionally, by offering relationship benefits beyond the products themselves, consumer willingness to purchase green products can be stimulated. Second, consistent with SDG 4—Quality Education—policymakers should promote environmental education initiatives. When consumers possess greater environmental knowledge, they may more readily accept the green marketing messaging of e-commerce platforms. Third, regulatory oversight should be strengthened to support marketing communication as a critical policy instrument for promoting green consumption, while ensuring its credibility, transparency, and trustworthiness. Rather than discouraging marketing communication, policymakers should establish clear standards and monitoring mechanisms for advertising and promotional practices to enhance accountability and prevent misleading claims. In this way, effective regulation can reinforce the positive role of marketing communication in facilitating responsible and trustworthy green marketing.

6. Limitations and future research

This study has several limitations. First, green and relationship marketing are highly context-specific (Papadas et al., 2017; Zhang et al., 2016). Accordingly, the proposed framework in this study may not be generalizable to other economic or political environments or business marketplace types. Second, from a methodological perspective, although the present study verifies the role of relational bonds in green marketing practices through cross-sectional quantitative research, how and why these bonds play a role in green consumption remains unclear. Accordingly, we suggest that future research adopt qualitative research methods, such as individual or focus-group interviews (Negi et al., 2023), to explore the role of these relationship interests in green consumption. A deeper understanding of these mechanisms would contribute to the development of more effective green marketing strategies and practices. Finally, although this study considers several moderators in the research framework, the potential influence of other factors cannot be ruled out. For example, this study does not consider brand awareness of green products, which may affect consumers' purchase intentions. Consumers who are less emotionally invested in green products may view brand awareness as a critical consumption signal for evaluating product quality that considerably influences their purchase decisions (Dabbous and Barakat, 2020).

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Appendix

Appendix A. Measurement Items

Construct	Measurement Item
Financial Bonds	1. I pay attention to discounts or price promotions for green products offered by the e-commerce platform.
	2. I consider it important that the e-commerce platform provides promotional activities for green products.
	3. I value shipping fee discounts offered by the e-commerce platform for green products.
	4. I value shopping credits or reward cashbacks offered by the e-commerce platform for green products.
Social Bonds	1. I consider it important that the e-commerce platform provides green product–related services with a friendly service attitude.
	2. I consider it important that the e-commerce platform provides green product–related services that are warm and friendly, like interactions with friends.
	3. I consider it important that the e-commerce platform provides personalized care and responsive service related to green products.
	4. I consider it important that the e-commerce platform provides frequent after-sales services and follow-up contact related to green products.
Structural Bonds	1. I consider it important that customer service staff of the e-commerce platform demonstrate enthusiasm and commitment when providing green product–related services.
	2. I consider it important that the e-commerce platform provides point accumulation and reward programs for green products.
	3. I consider it important that the e-commerce platform uses environmentally friendly packaging (e.g., recyclable or reusable materials) for green products.
	4. I consider it important that the e-commerce platform offers a wide variety of green product categories.
	5. I consider it important that the e-commerce platform provides environmentally friendly membership programs or activities related to green products.
	6. I believe that, compared with general products, green products offered by the e-commerce platform provide higher added value.
Relationship Quality	1. Overall, I am satisfied with my consumption experience on this e-commerce platform.
	2. I usually feel satisfied when shopping on this e-commerce platform.
	3. I have a high level of overall satisfaction with this e-commerce platform.
	4. I consider this e-commerce platform to be trustworthy.
	5. I believe this e-commerce platform prioritizes customers' interests.
	6. Even if I do not use this e-commerce platform for a period of time, I believe it will still value its customers.
	7. I consider this e-commerce platform to be my primary shopping platform.
	8. I intend to continue shopping on this e-commerce platform.
	9. I would recommend this e-commerce platform to others.

Construct	Measurement Item	
Marketing Communication Effect	1.	I believe that advertising for green products enhances my awareness and favorable impression of the products.
	2.	I believe that promotional activities for green products enhance my awareness and favorable impression of the products.
	3.	I believe that news coverage related to green products enhances my awareness and favorable impression of the products.
	4.	I believe that sales personnel's promotion of green products enhances my awareness and favorable impression of the products.
	5.	I believe that environmental issue–related activities associated with green products enhance my awareness and favorable impression of the products.
	6.	I believe that messages delivered through emails, push notifications, or flyers (both online and offline) enhance my awareness and favorable impression of green products.
Environmental Knowledge	1.	I am familiar with and concerned about the 3R principles (Recycle, Reuse, Reduce).
	2.	I understand and am willing to spend time learning about the importance of waste sorting and recycling.
	3.	I understand and am willing to spend time learning about environmental terms used in product information (e.g., carbon footprint, carbon reduction, net-zero emissions).
	4.	I understand and am willing to spend time learning about plastic reduction products.
	5.	I understand and am willing to spend time learning how to choose products and packaging that reduce waste generation.
	6.	I am knowledgeable about and willing to spend time learning about environmental issues.
Consumer Purchase Intention	1.	I am willing to purchase green products offered by this e-commerce platform.
	2.	I would recommend others to purchase green products from this e-commerce platform.
	3.	I intend to continue shopping on e-commerce platforms that promote green consumption.
	4.	I would recommend others to shop on e-commerce platforms that promote green consumption.
	5.	I am willing to increase my purchasing willingness toward e-commerce platforms that promote green consumption.