Consumer Drivers of Green Supply Chain Perceptions in Selangor, Malaysia: Implications for Sustainable Halal Ecosystems

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ABSTRACT

The transition toward sustainable halal ecosystems requires businesses to consider environmental responsibility alongside halal integrity, ethical sourcing, transparency, and consumer confidence. Green Supply Chain Management (GSCM) provides a practical approach for embedding environmental considerations into product design, procurement, manufacturing, packaging, logistics, and end-of-life management. However, consumer-related factors associated with perceptions of such practices have not been extensively examined in the Malaysian context. This study examines the relationships between environmental concern, environmental awareness, willingness to pay, trust in green claims, and consumers' perceptions of GSCM practices, and discusses their implications for sustainable halal ecosystem development. A quantitative cross-sectional survey was conducted among 184 consumers in Selangor, Malaysia, using purposive sampling and a structured questionnaire. Environmental awareness, trust in green claims, and environmental concern emerged as significant positive predictors of GSCM perceptions, while willingness to pay did not make a significant unique contribution when the other factors were considered. Environmental awareness was the strongest predictor, highlighting the importance of consumer knowledge in sustainability evaluation. The findings suggest that consumer perceptions are associated more strongly with awareness, credibility, and environmental concern than with financial willingness alone. The halal relevance is interpretive rather than a direct empirical test. Accordingly, the study offers exploratory implications for halal-oriented businesses by highlighting the value of credible green practices, transparent communication, consumer education, and trustworthy environmental claims in supporting environmentally responsible supply chain strategies.

Keywords: Green Supply Chain Management, sustainable halal ecosystem, environmental awareness, green trust, consumer behaviour

INTRODUCTION

Green Supply Chain Management (GSCM) has become an important response to growing environmental pressure on firms and supply networks. Rather than treating environmental performance as an isolated operational activity, GSCM integrates environmental considerations into product design, sourcing, procurement, manufacturing, logistics, packaging, distribution, recovery, and recycling. This broader supply chain perspective is increasingly important because consumers, regulators, investors, and communities evaluate businesses not only by product quality and price, but also by the environmental consequences of how products are produced and delivered (Herrmann et al., 2021; Siems et al., 2022).

In Malaysia, consumer concern about climate change and sustainable consumption has increased, while businesses face stronger expectations to demonstrate credible environmental practices. Previous research indicates that environmental concern, environmental awareness, willingness to pay, and trust in sustainability claims can influence how consumers evaluate environmentally responsible products and firms (Al-Kumaim et al., 2021; De Canio et al., 2021; Wojnarowska et al., 2020). However, much of the GSCM literature has focused on firm-level adoption and performance, leaving the consumer-side evaluation of supply chain

sustainability comparatively less developed.

This gap is relevant to the halal economy. Contemporary halal supply chains are increasingly expected to protect halal integrity while also responding to broader sustainability expectations. Research on halal logistics and manufacturing has begun to connect halal assurance with environmental, social, and governance principles, ethical sourcing, waste reduction, transparency, and long-term resilience (Asmadi & Saimy, 2025; Karudin et al., 2024; Shariff et al., 2024). Green supply chain and logistics practices have also been discussed as a way of strengthening system integrity in halal food operations, particularly where environmental performance must coexist with segregation, quality, and contamination controls (Ahmad et al., 2023).

Within this context, this study examines consumers' perceptions of GSCM practices in Selangor, Malaysia, and considers their implications for sustainable halal ecosystems. The research framework incorporates four consumer behaviour variables, namely environmental concern, environmental awareness, willingness to pay, and trust in green claims. The empirical analysis is not a direct test of halal-specific perceptions because the questionnaire did not include halal products, halal certification, religiosity, or halal supply chain attributes. Rather, the halal ecosystem serves as an application context for interpreting how consumer-related sustainability factors may inform environmental strategies in halal-oriented supply chains. Accordingly, this study addresses two questions: (1) which consumer behaviour factors are associated with perceptions of GSCM practices, and (2) what implications do these factors have for sustainability strategies within halal-oriented supply chains?

LITERATURE REVIEW

Green Supply Chain Management and consumer perception

GSCM seeks to reduce environmental impacts across the supply chain while maintaining operational and market performance. Its practices include green design, responsible procurement, resource-efficient manufacturing, green packaging and transport, and reverse logistics (Chatzoudes et al., 2024; Herrmann et al., 2021). From a consumer perspective, these practices are not always directly observable. Consumers therefore interpret environmental responsibility through information cues such as eco-labels, corporate communication, product design, packaging, and perceived credibility of sustainability commitments.

Consumer perception matters because firms gain limited reputational value from sustainability initiatives that customers do not recognize or trust. Environmental concern can make consumers more attentive to the consequences of business activity, while environmental awareness gives them the knowledge needed to interpret eco-labels, environmental certification, and supply chain effects (De Canio et al., 2021; Wojnarowska et al., 2020). Trust in green claims is particularly important in settings where greenwashing may weaken confidence in corporate sustainability statements. Willingness to pay reflects a stronger economic commitment to sustainable products, but it may not necessarily translate into a more favourable evaluation of underlying supply chain practices.

These consumer-related factors are also relevant when GSCM is considered in relation to sustainable halal ecosystems. Halal-oriented supply chains are increasingly expected to demonstrate not only product and process integrity, but also responsible sourcing, transparent operations, efficient resource use, and credible sustainability practices (Asmadi & Saimy, 2025; Shariff et al., 2024). Although the present survey does not measure halal-specific consumer perceptions, awareness, environmental concern, trust in green claims, and willingness to support sustainable products may provide useful insights for understanding how environmental responsibility can be communicated within halal-oriented supply chains. This creates an application-oriented link between consumer perception and the wider sustainability agenda, where green supply chain practices need to be both implemented and communicated clearly and credibly (Ahmad et al., 2023; Siems et al., 2022).

Sustainable halal ecosystems and the green supply chain interface

A sustainable halal ecosystem extends beyond the permissibility of inputs and processes to include responsible and resilient supply chain conduct. Recent halal research has highlighted the relationship between halal

integrity and sustainability, arguing that supply chain assurance, ethical operations, transparency, and environmental responsibility increasingly need to be managed together (Shariff et al., 2024). Similarly, ESG-oriented halal logistics research identifies ethical sourcing, waste reduction, stakeholder engagement, and environmental stewardship as areas where sustainability can reinforce Islamic supply chain values (Asmadi & Saimy, 2025).

Within sustainable halal ecosystems, halal assurance and environmental responsibility represent distinct but complementary dimensions of responsible supply chain management. Halal assurance focuses on maintaining compliance and product integrity throughout the supply chain, while environmental responsibility is reflected through sustainable sourcing, production, logistics, packaging, and recovery practices. In this study, halal is not modelled as an empirical variable. The GSCM findings are therefore interpreted as exploratory evidence that may inform halal-oriented firms seeking to strengthen and communicate environmental sustainability while maintaining the specific requirements of halal assurance.

Consumer Behaviour as a Driver of GSCM Perception

Consumer behaviour plays an important role in shaping how sustainability initiatives are recognised, evaluated, and supported. In the context of GSCM, consumers do not directly observe many supply chain activities such as procurement, manufacturing processes, logistics arrangements, or waste recovery. Their perceptions are therefore influenced by behavioural and cognitive factors that affect how they interpret sustainability-related information and business practices (Herrmann et al., 2021; Siems et al., 2022). Environmental concern and environmental awareness reflect consumers' sensitivity to environmental issues and their ability to understand green practices, while willingness to pay represents the extent of their economic commitment toward sustainable products (De Canio et al., 2021; Xia et al., 2022). Trust in green claims reflects the credibility consumers assign to environmental statements and sustainability information communicated by firms (Alamsyah et al., 2021). Together, these factors provide a useful basis for examining how consumers form perceptions of GSCM practices.

Within sustainable halal-oriented supply chains, these consumer-related factors are particularly relevant because environmental sustainability increasingly forms part of the broader expectations placed on businesses operating in the halal ecosystem. Recent studies have linked halal supply chain development with sustainability, ethical sourcing, environmental stewardship, transparency, and responsible logistics (Ahmad et al., 2023; Asmadi & Saimy, 2025; Shariff et al., 2024). Understanding how consumers respond to green practices can therefore help explain the conditions under which environmentally responsible supply chain initiatives are more likely to be recognised and valued. The following subsections review each factor and its relationship with consumer perceptions of GSCM practices.

Environmental Concern

Environmental concern refers to the extent to which individuals recognise environmental problems, perceive them as important, and feel a sense of responsibility toward environmental protection. Consumers with stronger environmental concern are generally more attentive to the environmental consequences of business activities and are more likely to support companies that demonstrate responsible environmental practices.

Previous studies indicate that environmental concern can strengthen pro-environmental attitudes and influence consumers' responses toward sustainable products and environmentally responsible firms (De Canio et al., 2021). In the context of supply chain management, environmentally concerned consumers may therefore evaluate businesses more favourably when they adopt green practices in sourcing, production, packaging, logistics, and waste management.

The relationship between environmental concern and consumer perception of GSCM is particularly relevant because many environmental impacts occur throughout the supply chain rather than only at the final product stage. Consumers who are more concerned about pollution, resource depletion, and environmental degradation may be more sensitive to whether firms adopt green procurement, resource-efficient manufacturing, sustainable packaging, and environmentally responsible logistics. This is consistent with research showing that

consumer expectations can encourage firms to strengthen environmental performance and supply chain responsibility. (Ahmed et al., 2020; Siems et al., 2022). Within halal-oriented supply chains, such concern may also support broader sustainability objectives by encouraging environmentally responsible practices alongside product and process integrity.

H1: There is a significant relationship between consumers' environmental concern and their perception of GSCM practices.

Environmental Awareness

Environmental awareness refers to consumers' knowledge and understanding of environmental issues, sustainability practices, and the environmental consequences associated with production and consumption. Consumers with higher environmental awareness are generally better able to recognise environmental labels, sustainable product characteristics, and responsible business practices.

Wojnarowska et al. (2020) found that eco-labelling can influence sustainable production and consumption by improving consumer understanding of environmental information. Similarly, Żuchowski et al. (2023) emphasised that greater awareness of eco-labelling can affect consumer behaviour by enabling individuals to make more informed evaluations of environmental claims.

Environmental awareness is closely related to consumer perception of GSCM because supply chain practices are often not directly visible to end consumers. Consumers need sufficient knowledge to interpret information related to green sourcing, manufacturing, packaging, transportation, recycling, and environmental certification. When consumers understand these practices, they are more likely to recognise the environmental efforts undertaken by businesses and form favourable perceptions of GSCM.

This is especially relevant in sustainable halal ecosystems, where businesses increasingly need to communicate both product integrity and broader sustainability performance in a clear and credible manner. The current study also treats environmental awareness as one of the central consumer behaviour factors influencing GSCM perception.

H2: There is a significant relationship between consumers' environmental awareness and their perception of GSCM practices.

Willingness to Pay

Willingness to pay refers to the extent to which consumers are prepared to spend a higher amount for products or services that provide additional environmental benefits. In sustainability research, willingness to pay is often used as an indicator of the strength of consumers' support for environmentally responsible products. Consumers who perceive environmental benefits as valuable may be more willing to accept higher prices for green products, energy-efficient products, or products produced through more sustainable processes (Zhang et al., 2020; Xia et al., 2022). In this sense, willingness to pay may reflect a stronger commitment to sustainability compared with environmental concern or awareness alone.

However, willingness to pay does not always translate directly into a favourable perception of broader supply chain sustainability. Consumers may be willing to pay a premium for a particular green product without necessarily understanding the firm's procurement, manufacturing, logistics, or recycling practices. Adialita et al. (2025) also showed that willingness to pay for sustainable products can be influenced by behavioural and contextual factors.

Therefore, while willingness to pay may indicate consumer support for green products, its relationship with perceptions of GSCM may depend on the extent to which consumers recognise and value environmental practices throughout the supply chain. This distinction is important for halal-oriented businesses because sustainability strategies should not rely solely on consumers' readiness to pay more, but also on how effectively environmental value is communicated and demonstrated.

H3: There is a significant relationship between consumers' willingness to pay and their perception of GSCM practices.

Trust in Green Claims

Trust in green claims refers to the extent to which consumers believe that environmental statements, eco-labels, sustainability commitments, and green marketing information provided by businesses are accurate and credible. Trust is particularly important in sustainability because many environmental practices are difficult for consumers to verify directly. Consumers therefore rely on corporate communication, product labels, certifications, and other information signals when evaluating whether a company is genuinely environmentally responsible. Alamsyah et al. (2021) found that green trust plays an important role in shaping consumer responses toward eco-friendly products and environmental business strategies.

Trust in green claims can significantly influence consumer perceptions of GSCM because credible environmental information helps consumers evaluate whether green supply chain practices are genuine rather than merely promotional. Where consumers trust the environmental claims made by a firm, they are more likely to perceive practices such as green procurement, sustainable manufacturing, eco-friendly packaging, and recycling programmes positively. In contrast, misleading or exaggerated claims may create scepticism and weaken consumer confidence. This issue is especially relevant within halal-oriented supply chains, where trust, assurance, transparency, and integrity are already important elements of consumer confidence (Shariff et al., 2024). Consequently, credible green claims may strengthen consumers' evaluations of sustainability practices across the wider supply chain.

H4: There is a significant relationship between consumers' trust in green claims and their perception of GSCM practices.

Based on the preceding discussion and proposed hypotheses, a research framework was developed to illustrate the relationships between the independent variables and the dependent variable. Figure 1 presents the research framework of this study.

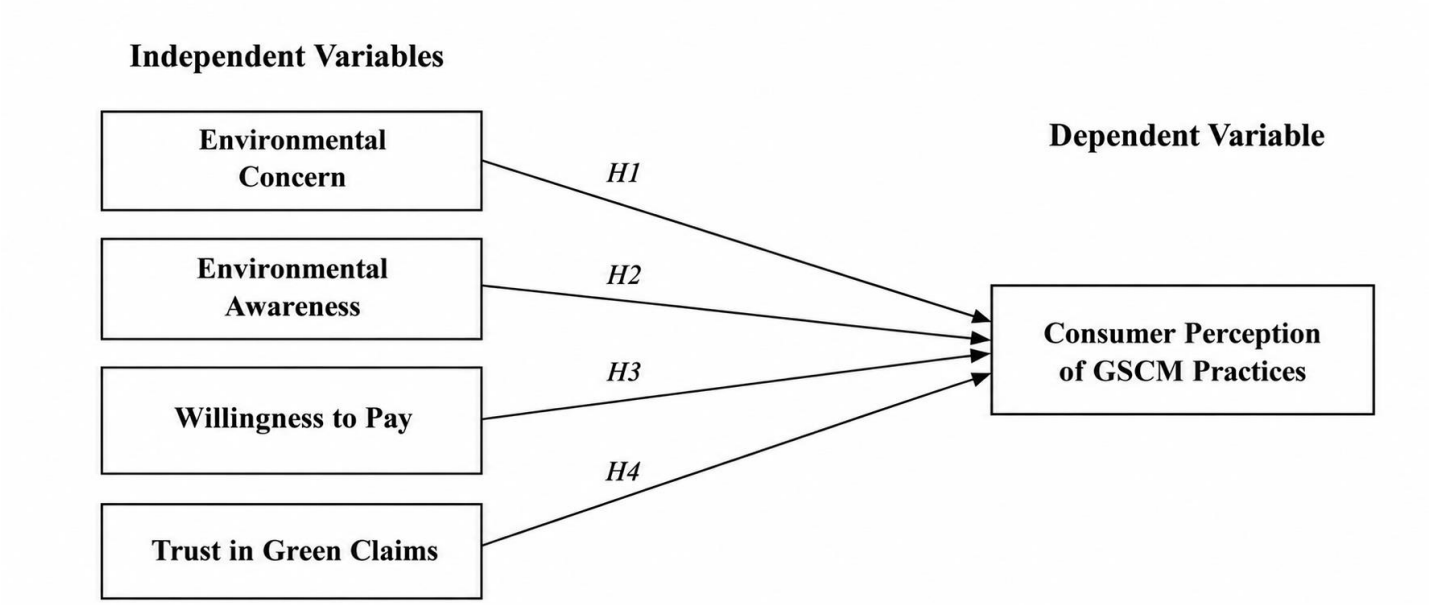


Figure 1. Research Framework

METHODOLOGY

The study employed a deductive, quantitative, cross-sectional survey design. The research was conducted in Selangor, Malaysia. The cross-sectional design was used to examine statistical associations among the study variables at a single point in time and does not permit conclusions about causal direction.

Purposive sampling was used to recruit consumers who were aware of or concerned about environmental and sustainability issues. A total of 184 usable responses were obtained through a structured Google Forms questionnaire. Because this is a non-probability sampling approach and participation targeted environmentally engaged consumers, the sample may be more sustainability-conscious than the broader consumer population. The findings are therefore interpreted as evidence from the study sample rather than as estimates that are representative of all consumers in Selangor or Malaysia.

The questionnaire contained three sections. Section A captured demographic characteristics including gender, age, occupational status, monthly income, and residential area. Section B measured environmental concern, environmental awareness, willingness to pay, and trust in green claims, with four items for each construct. Section C measured consumer perception of GSCM practices using four items covering green design, environmentally responsible procurement and manufacturing, green logistics, and reverse logistics and recycling. All construct items used a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). Measurement items were adapted from established literature on sustainable consumption, environmental concern, eco-labelling, willingness to pay, green trust, and GSCM. The item wording is reported together with the pilot-stage reliability results in Table 1 to improve measurement transparency.

A pilot test involving 30 respondents was conducted before the full survey to assess the internal consistency of the measurement instrument. Cronbach's alpha was calculated for each construct, with 0.70 used as the minimum acceptable threshold. The pilot-stage reliability results are reported in Table 1. The original analysis did not report construct-level reliability coefficients again for the final sample; this is acknowledged as a measurement limitation. The final dataset was analysed using IBM SPSS Statistics 25. Descriptive statistics were used to summarise the constructs and respondent profile, Pearson correlation was used to examine bivariate relationships, and multiple linear regression was used to assess the unique statistical contribution of the four predictors to consumer perceptions of GSCM. All study variables were collected through the same self-report questionnaire, and no dedicated post hoc common-method-bias diagnostic was reported in the original analysis; this issue is also considered in the limitations.

RESULTS

Pilot-Stage Reliability

The pilot test demonstrated acceptable internal consistency for all five constructs. Cronbach's alpha was 0.845 for environmental concern, 0.721 for environmental awareness, 0.824 for willingness to pay, 0.755 for trust in green claims, and 0.743 for consumer perception of GSCM practices. The overall alpha across the 20 construct items was 0.863. All coefficients exceeded the 0.70 threshold, supporting the reliability of the measurement instrument at the pilot stage. For transparency, Table 1 reports both the measurement items and the corresponding Cronbach's alpha values.

Table 1. Measurement items and pilot-stage reliability of the constructs

Construct	Measurement items	Cronbach's alpha
Environmental concern	1. I am concerned about the negative effects of pollution on the environment. 2. I believe we all must protect the environment. 3. I feel personally responsible for reducing environmental damage. 4. I support environmental laws and regulations.	0.845
Environmental awareness	1. I am aware of the environmental consequences of my purchasing choices. 2. I understand how the supply chain affects the environment. 3. I am familiar with eco-labels and green product certifications. 4. I follow news or information related to environmental issues.	0.721
Willingness to pay	1. I am willing to pay more for environmentally friendly products. 2. I believe the higher cost of green products is worth the environmental benefits.	0.824

	3. I have previously bought sustainable products even when they cost more. 4. I choose eco-friendly products even when cheaper alternatives are available.	
Trust in green claims	1. I trust companies that claim to use environmentally sustainable practices. 2. I believe that green product labels reflect real environmental benefits. 3. I am confident in the sustainability claims made by businesses I support. 4. I believe third-party environmental certifications are trustworthy.	0.755
Consumer perception of GSCM practices	1. I support companies that design eco-friendly products that reduce environmental impact. 2. I prefer businesses that use raw materials and production processes that are environmentally friendly. 3. I notice when companies use eco-friendly packaging and sustainable delivery methods. 4. I support companies that offer return, recycling, or disposal programs for used products.	0.743
Overall instrument	All 20 measurement items across the five constructs.	0.863

Respondent Profile

The sample profile is reported to contextualise the non-probability sample. Women represented 54.9% of respondents and men 45.1%. The largest age group was 18–24 years (30.4%), followed by 35–44 years (26.1%) and 25–34 years (22.8%). Full-time employees constituted 41.8% of the sample, while 29.3% were students. More than half of respondents (53.3%) reported monthly income below RM2,500. These characteristics reinforce the need to interpret the results within the composition of the study sample rather than as population estimates.

Table 2. Respondent demographic profile

Characteristic	**Category**	**N**	**%**
Gender	Female	101	54.9
	Male	83	45.1
Age	Below 18	13	7.1
	18–24	56	30.4
	25–34	42	22.8
	35–44	48	26.1
	55 and above	25	13.6
Occupational status	Full-time employed	77	41.8
	Student	54	29.3
	Part-time employed	21	11.4
	Self-employed	19	10.3
	Unemployed	13	7.1
Monthly income	Below RM2,500	98	53.3
	RM2,501–RM5,000	56	30.4
	RM5,001–RM7,500	28	15.2
	RM7,501–RM10,000	2	1.1
	Above RM10,000	0	0.0

Descriptive Statistics and Correlations

All constructs recorded mean scores above 4.00, indicating generally favourable environmental attitudes and positive perceptions of GSCM. Consumer perception of GSCM practices recorded the highest mean (M = 4.3927, SD = 0.6656). Environmental awareness recorded M = 4.1712 (SD = 0.6005), environmental concern

M = 4.1576 (SD = 0.6552), trust in green claims M = 4.0897 (SD = 0.5989), and willingness to pay M = 4.0285 (SD = 0.6751).

Table 3. Descriptive statistics and correlations with consumer perception of GSCM

Construct	Mean	SD	Correlation with GSCM perception (r)
Environmental concern	4.1576	0.6552	0.700**
Environmental awareness	4.1712	0.6005	0.748**
Willingness to pay	4.0285	0.6751	0.660**
Trust in green claims	4.0897	0.5989	0.699**
Consumer perception of GSCM	4.3927	0.6656	—

Note: ** $p < 0.01$.

Pearson correlation analysis showed significant positive relationships between all four predictors and consumer perception of GSCM. Environmental awareness had the strongest bivariate relationship (r = 0.748), followed by environmental concern (r = 0.700), trust in green claims (r = 0.699), and willingness to pay (r = 0.660). These results suggest that, at the bivariate level, consumers with stronger environmental knowledge, concern, trust, and willingness to pay were also more likely to evaluate GSCM practices positively.

Multiple Regression and Hypothesis Testing

The regression model was statistically significant, $F = 77.933$, $p < 0.001$, with $R = 0.797$ and $R^2 = 0.635$. Thus, the four consumer behaviour variables collectively explained 63.5% of the variance in consumer perceptions of GSCM practices within the sample. Three variables made statistically significant unique contributions when considered simultaneously: environmental awareness, trust in green claims, and environmental concern. Willingness to pay did not make a significant unique contribution. Given the cross-sectional design, these coefficients are interpreted as predictive associations rather than evidence of causal effects.

Table 4. Multiple regression and hypothesis testing results

Hypothesis	Predictor	β	t	p	Decision
H1	Environmental concern	0.232	3.051	0.003	Supported
H2	Environmental awareness	0.288	3.154	0.002	Supported
H3	Willingness to pay	0.102	1.396	0.164	Not supported
H4	Trust in green claims	0.271	3.833	<0.001	Supported

DISCUSSION

Consumer Behaviour Factors Associated with Perceptions of GSCM Practices

The findings indicate that environmental awareness, trust in green claims, and environmental concern are the key consumer behaviour factors associated with perceptions of Green Supply Chain Management practices. Environmental awareness emerged as the strongest statistical predictor, followed by trust in green claims and environmental concern, while willingness to pay did not make a significant independent contribution when the other factors were considered simultaneously. These results identify patterns of association within the sample and should not be interpreted as establishing causal direction.

Environmental awareness plays a particularly important role because consumers need sufficient knowledge to recognise and evaluate environmentally responsible supply chain practices. Consumers who understand environmental issues, eco-labelling, sustainable packaging, responsible sourcing, and the environmental effects of production and logistics are more likely to form favourable perceptions of GSCM. Previous research

similarly shows that environmental knowledge and eco-labelling can influence sustainable consumption and improve consumers' ability to evaluate environmentally responsible business practices (Wojnarowska et al., 2020; Žuchowski et al., 2023). The strong influence of awareness in this study is also reflected in the correlation results, where environmental awareness recorded the strongest positive relationship with perceptions of GSCM practices.

Trust in green claims also significantly shapes consumer perceptions. Many supply chain activities are not directly observable by consumers, which means that consumers often rely on information communicated through environmental claims, labels, certifications, packaging, and corporate sustainability communication. Where such information is perceived as credible, consumers are more likely to evaluate a firm's environmental practices positively. Research on green trust similarly suggests that confidence in environmental claims can strengthen favourable consumer responses toward eco-friendly products and sustainable business practices (Alamsyah et al., 2021). In contrast, weak or misleading sustainability claims may undermine confidence even where genuine environmental improvements have been implemented. Credibility is therefore an important condition for translating operational sustainability practices into positive consumer perceptions.

Environmental concern further contributes to favourable perceptions of GSCM. Consumers who are more concerned about environmental degradation and who recognise the importance of environmental protection are more likely to support firms that demonstrate environmentally responsible behaviour. This finding is consistent with De Canio et al. (2021), who identify environmental concern as an important influence on pro-environmental consumer intentions. This finding is also consistent with previous research showing that consumer expectations can influence business sustainability priorities and supply chain practices. (Ahmed et al., 2020; Siems et al., 2022).

In contrast, willingness to pay did not significantly predict perceptions of GSCM once the other variables were considered simultaneously. Although willingness to pay was positively correlated with GSCM perception at the bivariate level, its unique contribution became non-significant in the multivariate model. One explanation is that willingness to pay captures a purchase-related financial trade-off, whereas the dependent variable concerns evaluation of broader supply chain practices that consumers may judge through knowledge, concern, and credibility cues. A second possibility is that some consumers regard responsible environmental practices as a basic expectation of firms rather than an optional feature that should require a price premium. Prior research similarly indicates that willingness to pay varies with perceived value, information, and other behavioural conditions and does not always translate directly into stronger support for wider sustainability initiatives (Adialita et al., 2025; Xia et al., 2022). In halal-oriented markets, any interaction between sustainability premiums and halal-related price expectations remains an open question because halal involvement and halal purchase behaviour were not measured in this study. Overall, the first research question is answered by showing that environmental awareness, trust in green claims, and environmental concern are the main factors associated with consumer perceptions of GSCM, while willingness to pay has a comparatively limited independent association.

Supporting Sustainability Strategies within Halal-Oriented Supply Chains

The findings provide exploratory strategic implications for halal-oriented supply chains rather than direct evidence about halal consumer behaviour. As halal industries respond to broader sustainability expectations, environmentally responsible supply chain practices may complement priorities related to integrity, traceability, responsible sourcing, and operational transparency. Recent studies on halal supply chains similarly highlight the growing importance of sustainability, environmental stewardship, ethical sourcing, governance, and ESG-oriented practices within the halal ecosystem (Asmadi & Saimy, 2025; Shariff et al., 2024). Research in halal food supply chains also suggests that green supply chain and logistics practices can contribute to environmental performance while supporting broader supply chain management objectives (Ahmad et al., 2023). The present findings therefore inform this context cautiously by identifying consumer-related GSCM factors that halal-oriented firms may wish to consider, while recognising that halal-specific relationships require direct testing.

First, the strong influence of environmental awareness suggests that consumer education should form an important component of sustainability strategy. Halal-oriented businesses can communicate how environmental responsibility is incorporated into sourcing, production, packaging, logistics, recycling, and waste management. Such communication can improve the visibility of GSCM practices and enable consumers to recognise environmental efforts across the supply chain. This is particularly relevant because eco-labelling and environmental information can support consumer understanding and more informed sustainable consumption decisions (Wojnarowska et al., 2020; Žuchowski et al., 2023).

Second, the significant role of trust in green claims indicates that sustainability strategies should emphasise credibility and transparency. Environmental claims should be specific, evidence-based, and supported by reliable information or recognised environmental standards. In the halal ecosystem, credibility is particularly important because consumer confidence is closely associated with assurance, transparency, certification, and supply chain integrity. Shariff et al. (2024) highlight the importance of integrity and sustainability within the halal supply chain ecosystem, while Asmadi and Saimy (2025) emphasise governance, ethical sourcing, and environmental stewardship in sustainable halal logistics. Accordingly, halal-oriented businesses should ensure that environmental communication strengthens stakeholder confidence.

Third, the positive effect of environmental concern suggests that firms should align sustainability strategies with the expectations of environmentally conscious consumers. Green procurement, resource-efficient production, sustainable packaging, environmentally responsible logistics, and waste reduction can support environmental performance and broader stakeholder expectations. GSCM research shows that environmental collaboration and responsible supply chain practices can contribute to improved sustainability performance and stronger stakeholder relationships (Ahmed et al., 2020; Lin et al., 2020). For halal-oriented businesses, these practices can strengthen the sustainability dimension of supply chain management while maintaining the distinct requirements of halal assurance.

Finally, the non-significant unique contribution of willingness to pay suggests that sustainability strategies should not depend primarily on consumers accepting higher prices. Instead, businesses may benefit from improving operational efficiency, credible sustainability performance, consumer trust, and clear value communication. The result may indicate that respondents distinguish between paying a premium for a green product and evaluating whether a company manages its wider supply chain responsibly. It may also reflect an expectation that sustainable practices should increasingly be part of normal business conduct rather than an optional premium feature. Previous research shows that willingness to pay for green products can vary according to perceived value, information, and consumer attitudes, meaning that premium pricing alone may not be an effective sustainability strategy (Zhang et al., 2020; Xia et al., 2022; Adialita et al., 2025). For halal-oriented supply chains, these interpretations should be treated as propositions for future testing because the study did not measure halal purchase frequency, halal involvement, or perceptions of halal-related price premiums. The second research question is therefore addressed at an implication level: awareness, trust, and environmental concern suggest potential value in consumer education, transparent environmental communication, credible sustainability claims, responsible sourcing and operations, and reduced dependence on premium pricing.

LIMITATIONS AND FUTURE RESEARCH

Several limitations should be considered when interpreting the findings. First, the study used purposive sampling and specifically recruited consumers who were aware of or concerned about environmental and sustainability issues. This creates potential self-selection bias and means that the sample may be more environmentally engaged than the wider consumer population. In addition, all respondents were drawn from Selangor. The results therefore cannot be generalised statistically to all consumers in Selangor or Malaysia. The demographic profile further shows concentrations in particular age, occupational, and income groups. Future research should use broader probability-based sampling frames, include respondents from multiple Malaysian states, and, where feasible, compare the sample with population benchmarks or apply appropriate weighting procedures.

Second, the cross-sectional design identifies associations but cannot establish causal direction. Longitudinal or experimental designs would be required to determine whether factors such as environmental awareness lead to more favourable GSCM perceptions over time. Third, all constructs were collected in a single self-report questionnaire, creating the possibility of common method variance. No dedicated Harman single-factor test, marker-variable procedure, or full-collinearity assessment was reported in the original analysis, so the magnitude of the observed relationships should be interpreted cautiously. Future studies should incorporate procedural separation and statistical diagnostics for common method bias.

Fourth, reliability was established at the pilot stage, but construct-level Cronbach's alpha values were not reported again for the final sample. Although the items were adapted from prior literature and the pilot coefficients exceeded 0.70, future studies should report final-sample reliability and conduct a fuller assessment of measurement validity. The item wording used in this study is reported in Table 1 together with the pilot-stage reliability coefficients for transparency.

Finally, the questionnaire measured general GSCM perceptions rather than halal-specific perceptions, halal certification trust, religiosity, halal purchase frequency, or halal supply chain attributes. The halal implications in this paper should therefore be read as exploratory applications of the GSCM findings, not as direct empirical evidence about halal consumers. Future research can test whether these relationships differ between halal and non-halal contexts and across demographic or halal-involvement groups.

CONCLUSION

This study concludes that environmental awareness, trust in green claims, and environmental concern were significant positive predictors of consumers' perceptions of Green Supply Chain Management practices in the study sample, while willingness to pay did not have a significant independent association when the other factors were considered simultaneously. Among the significant predictors, environmental awareness recorded the strongest standardised coefficient, followed by trust in green claims and environmental concern.

The model explained 63.5% of the variance in GSCM perceptions. These results indicate that consumer knowledge, perceived credibility of sustainability information, and environmental concern are more strongly associated with GSCM evaluations than financial willingness alone, while the cross-sectional design prevents causal interpretation.

Taken together, the findings suggest that favourable evaluations of GSCM are linked not only to the environmental practices undertaken by firms but also to consumers' capacity to recognise and trust those practices. This highlights the importance of making sustainability efforts visible, credible, and meaningful through clear communication, reliable environmental information, and consistent operational practices. For halal-oriented supply chains, this interpretation is exploratory: environmental responsibility may form part of a broader sustainability agenda alongside halal assurance, but the relationship should be tested directly using halal-specific measures in future research.

The study contributes to consumer-oriented GSCM research by identifying behavioural factors associated with perceptions of sustainable supply chain practices and by outlining carefully bounded implications for sustainable halal ecosystems. Practically, the findings suggest that firms may benefit from consumer education, credible environmental communication, responsible sourcing, resource-efficient production, sustainable packaging and logistics, and waste reduction, while policymakers and industry bodies can support these efforts through clearer environmental standards, credible eco-labelling, and transparent sustainability guidance. These implications should remain distinct from formal halal certification and should be validated in future studies that directly measure halal-related consumer perceptions and behaviour.

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