

Systematic Literature Review on Green Purchasing Behavior in E-commerce: A TCCM Framework-Based Analysis

Zeng Yu^{1,2}, Sofian Rosbi³, Mohammad Harith Amlus⁴

^{1,3,4}Faculty of Business and Communication, University Malaysia Perlis, 02100 Padang Besar, Perlis, Malaysia

²Faculty of Business, Pingxiang University, 337000 Pingxiang, Jiangxi, China

*Corresponding Author

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ABSTRACT

Green purchasing behavior has become an important social trend and lifestyle that can drive and promote sustainable economic development. This study integrates empirical evidence on the determinants of green purchasing behavior in e-commerce from 2021 to 2025, and examines the dynamic interaction between consumer cognition, platform mechanisms. The study uses a systematic review of peer-reviewed articles based on the Web of Science database. The literature was quantitatively analyzed, and the content was interpreted according to the TCCM framework (theory, content, characteristics, and method). Future research should give priority to longitudinal designs to track behavioral evolution and develop ethical frameworks for artificial intelligence deployment. The interdisciplinary integration of behavioral economics, computational optimization, and neuroscience is essential to enhance the theoretical rigor and practical influence of green development in e-commerce.

Keywords: Green purchasing behavior; E-commerce; TCCM

INTRODUCTION

Against the backdrop of increasingly severe environmental challenges and the growing importance of sustainable development, green purchasing behavior has become an important research topic in academia and practice (Li et al., 2025). The booming development of e-commerce has provided new variables and contexts for understanding how consumers engage in environmentally responsible consumption (Wang et al., 2025). Although a large body of literature has explored green consumer behavior, there is still a lack of systematic and theoretical reviews of e-commerce platforms, especially comparative studies of domestic and foreign research (Wijekoon & Sabri, 2021). This study conducted a quantitative statistical analysis of relevant literature from 2021 to 2025, aiming to identify research hotspots, knowledge structures, and emerging trends. This review adopts the TCCM framework—context, content, theme, and method—to comprehensively analyze the development and future directions of this field (Sharma et al., 2023).

Methodology

This systematic review employed bibliometric data retrieved from the Web of Science Core Collection using a Boolean search strategy combining core conceptual clusters: TS= (“electronic commerce” OR “e-commerce” OR “online shopping” OR “online retail*”) AND TS= (consumer* OR purchaser* OR buyer*) AND TS= (“green purchase behavior*” OR “green buying” OR “green consumption” OR “environmental consumption”). A total of 1336 search results were obtained. To accurately obtain literature that meets the subject content, the following steps are used to screen the literature (Jacobsen et al., 2022).

Firstly, the search was confined to peer-reviewed journal articles published between January 2021 and December 2025, yielding an initial dataset of 390 publications through the Web of Science Core Collection

export function. Then, specific subject categories were identified, focusing on Operations Research Management Science or Business or Management or Behavioral Sciences, returning 80 papers. Subsequent screening applied dual-phase quality control: initial title/abstract filtering excluded non-relevant contexts (e.g., B2B models or physical retail studies), followed by full-text assessment eliminating publications with methodological ambiguities or purely conceptual frameworks. This process resulted in a final corpus of 19 high-quality articles focused exclusively on sustainable online consumer behavior.

TCCM Framework Analysis

This study reviews 19 research papers based on the theory, context, characteristics, and methodology (TCCM) framework (Sharma et al., 2023). This study expands the research body by reflecting on the common and specific factors that influence green purchases by online consumers. Finally, this review proposes research gaps and future trends in this research field from the perspectives of theory, context, characteristics, and methodology.

Theories (T)

The reviewed literature demonstrates strong theoretical pluralism, with signaling theory (Fu et al., 2022) and planned behavior theory (Wang et al., 2025) emerging as dominant frameworks for explaining green consumption mechanisms. Notably, evolutionary game theory and regulatory focus theory were innovatively adapted to e-commerce contexts, addressing the intention-behavior gap through mathematical modeling and neuromarketing approaches, respectively (He et al., 2021). Recent theoretical advancements include the integration of para-social interaction theory to explain livestreaming commerce dynamics, demonstrating how streamer-consumer relationships mediate message framing effects (Long et al., 2024a). However, the predominance of Western-originated theories in Asian e-commerce contexts suggests potential cultural boundary conditions requiring further validation. The details are shown in Table 1.

Table 1 Classification of Theoretical Frameworks

NO	Theory	Cite
1	SOR	(Shao et al., 2024)
2	TPB	(Wattoo et al., 2025)
3	Signaling theory	(Fu et al., 2022)
4	Circular economy action framework	(Purcărea et al., 2022)
5	Behavioral framing effects	(Bar et al., 2023)
6	Evolutionary game theory	(He et al., 2021)
7	Extended UTAUT	(Oktaviani et al., 2024)
8	Internet access capability theory	(Peng et al., 2022a)
9	TPB extension	(Wang et al., 2025)
10	para-social interaction theory	(Long et al., 2024)
11	Uncertainty theory	(Gao et al., 2025)
12	Health behavior theory	(Wang et al., 2024)
13	Supply chain collaboration	(Mu et al., 2021)
14	Stochastic differential game	(Wang et al., 2023)
15	CNN-LSTM hybrid model	(Huang et al., 2022b)
16	Effective disclosure scenarios	(Liu et al., 2024)

17	Consumption value theory	(Wang & Li, 2023)
18	Regulatory focus theory	(Najafabadiha et al., 2025)
19	LBBA model	(Na et al., 2024)

Contexts

The extant literature manifests a multi-layered contextual landscape concentrated within the digital-commerce ecosystem, where e-commerce platforms, live streaming, and social media analytics constitute dominant empirical settings. Significant contextual variations arise across three dimensions:

(1) Consumer Heterogeneity, encompassing behavioral segmentation. For instance, dark, light, and non-green consumers in defective organic food contexts (Oktaviani et al., 2024). value perception disparities between online/offline channels (Wang & Li, 2024), and neurocognitive responses to environmental stimuli (Najafabadiha et al., 2025).

(2) Product-Information Dynamics, evidenced by framing effects, transparency mechanisms (Fu et al., 2022), and environmental disclosure scenarios influencing channel selection (Liu et al., 2024).

(3) Institutional-Strategic Embeddedness, spanning supply chain governance with reward-punishment mechanisms, multi-agent supervision models (He et al., 2021), cross-border policy pilots (Wang et al., 2024), and collaborative innovation in green technology promotion (Mu et al., 2021). As shown in Table 2.

Table 2 Thematic Clustering of Research Content

NO	Contents	Cite
1	The impact of e-commerce platform big data strategies (personalized recommendations/user experience) on green consumer behavior	(Shao et al., 2024)
2	Three-stage decision-making model for green consumption of agricultural products (pre-purchase-actual-re-purchase)	(Wattoo et al., 2025)
3	The impact of green agricultural product production information transparency on online trust and purchasing behavior	(Fu et al., 2022)
4	Green consumer behavior changes in the Romanian retail market and retailers' agile transformation strategies	(Purcarea et al., 2022)
5	The impact of information framing (economic benefits vs. environmental benefits) on solar panel purchase commitments	(Bär et al., 2023)
6	Green product quality supervision mechanism under the four-party game of government, platform, seller and consumer	(He et al., 2021)
7	The impact of green consumer classification (dark green/light green/non-green) on online purchase intention of defective organic food	(Oktaviani et al., 2024)
8	The relationship between green consumption and the Internet (e-commerce/e-government) as measured by Baidu Index	(Peng et al., 2023)

9	The regulatory mechanism of e-commerce product environmental information on the green consumption intention-behavior gap	(Wang et al., 2025)
10	The impact of green product information framing (personal vs. social benefits) on purchase intention in live e-commerce	(Long et al., 2024)
11	Delivery time and pricing strategy of green e-commerce supply chain under reward and punishment mechanism	(Gao et al., 2025)
12	The role of digital trade (cross-border e-commerce pilot) in promoting residents' health	(Wang et al., 2024)
13	Collaborative strategy of green technology innovation and promotion services in a two-stage supply chain	(Mu et al., 2021)
14	Dynamic promotion cooperation strategy between green packaging manufacturers and e-commerce platforms	(Wang et al., 2023)
15	Analysis of Weibo public opinion reveals public sentiment and hot topics about green consumption	(Huang et al., 2022)
16	The impact of carbon information disclosure scenarios on online and offline shopping channel selection	(Liu et al., 2024)
17	Differences in consumption value between online and offline channels for fresh food (emotional value/conditional value)	(Wang & Li, 2024)
18	Neuromarketing effects of preventive/promotional environmental videos on online purchase intention of green products	(Najafabadiha et al., 2025)
19	Analysis of sentiment themes and driving factors in online reviews of first-class energy-saving refrigerators	(Na et al., 2024)

Characteristics

The extant research converges on several salient features that shape e-commerce consumers' green purchasing behavior. First, affective and evaluative drivers—including green satisfaction and price sensitivity—have been shown to jointly influence platform engagement (Shao et al., 2024). Second, product-related quality attributes and emotional intensity catalyze both positive consumption and complaint responses, underscoring the dual role of quality perception in green purchase contexts (Wattoo et al., 2025). Third, informational transparency—both technological and managerial—differentially fosters ability trust and benevolence trust, suggesting a nuanced pathway through which trust dimensions mediate green buying decisions (Fu et al., 2022). Fourth, macro-environmental shocks such as the COVID-19 pandemic have accelerated digital adoption and shifted national e-commerce preferences, reiterating the contextual dependency of green purchase characteristics (Purcărea et al., 2022). Fifth, region-specific and product-type differences emerge: for instance, durable goods elicit distinct behavioral patterns compared to fast-moving consumer goods (Wang et al., 2025b), while eastern provinces in China exhibit stronger spillover from government supervision than from platform self-regulation (Peng et al., 2022b). Finally, scenario-based nuances—such as short-distance shopping under three kilometers—and demographic moderators like gender and regional development further refine our understanding of characteristic effects (Huang et al., 2022a). Together, these findings highlight that the “Characteristics” layer encompasses a complex interplay of affective, informational, contextual, and demographic factors that warrant integrated, multi-level analysis in future green consumption studies. As shown in Table 3.

Table 3 Characterization of Research Features

NO	Characteristics	Cite
1	Green satisfaction, price sensitivity, Alibaba user behavior	(Shao et al., 2024)
2	Quality factors, emotional intensity, complaint behavior	(Wattoo et al., 2025)
3	Technology/means information transparency, ability trust and benevolence trust differential effects	(Fu et al., 2022)
4	COVID-19 accelerates digitalization, China's e-commerce preference	(Purcarea et al., 2022)
5	The economic benefit framework has the best effect	(Bär et al., 2023)
6	Complaint behavior, punishment intensity, regulatory efficiency	(He et al., 2021)
7	The mediating effect of network label quality (WLQ)	(Oktaviani et al., 2024)
8	The eastern region has a significant effect, and government supervision is better than e-commerce	(Peng et al., 2023)
9	The differential effect of durable consumer goods and fast-moving consumer goods	(Wang et al., 2025)
10	The mediating effect of product utility perception and environmental self-responsibility	(Long et al., 2024)
11	The impact of risk attitude and confidence level on sales model selection	(Gao et al., 2025)
12	Green consumption, energy poverty alleviation, and environmental improvement mediating path	(Wang et al., 2024)
13	Online free-riding behavior and the moderating effect of cooperation level	(Mu et al., 2021)
14	Attitude-behavior gap, welfare distribution mechanism	(Wang et al., 2023)
15	Women/economically developed regions pay more attention, and negative emotions come from high prices and one-size-fits-all policies	(Huang et al., 2022)
16	The significant effect of 3-kilometer short-distance shopping scenarios	(Liu et al., 2024)
17	Offline emphasis on immediacy, online emphasis on convenience and trust	(Wang & Li, 2024)
18	Eye tracking shows that preventive information attracts more attention	(Najafabadiha et al., 2025)
19	Energy efficiency, noise, and cost issues are the main negative themes	(Na et al., 2024)

METHODOLOGY

E-commerce green purchase research demonstrates methodological pluralism tailored to capture both behavioral mechanisms and market outcomes. Predominantly, structural equation modeling (SEM) remains a cornerstone—employed alone or in tandem with cluster analysis for multi-group comparisons (Oktaviani et al., 2024), and frequently underpinned by large-scale questionnaire surveys (Wang & Li, 2023). Complementing SEM, partial least squares SEM (PLS-SEM) has been adopted to address measurement challenges in complex

models (Wang et al., 2025). Controlled experiments span from field-scale randomized trials (Bar et al., 2023) to double experimental designs isolating mediation effects (Long et al., 2024). Econometric techniques—fixed effects and difference-in-differences—further enable causal inference amidst observational data. Game-theoretic models, both evolutionary and centralized versus decentralized forms, augmented by numerical simulation (Gao et al., 2025). Elucidate strategic interactions among stakeholders. Novel computational approaches—text mining paired with deep-learning sentiment analysis (Huang et al., 2022) or transfer learning (Na et al., 2024) underscore an increasing convergence of behavioral insights with big-data analytics. As shown in Table 4.

Table 4 Methodology Classification

NO	Method	Cite
1	Questionnaire survey + structural equation model (SEM)	(Shao et al., 2024)
2	Longitudinal study (473 respondents)	(Wattoo et al., 2025)
3	Structural equation model (SEM)	(Fu et al., 2022)
4	Quantitative survey (supermarket chain data)	(Purcarea et al., 2022)
5	Large-scale randomized controlled experiment (N=26,873)	(Bär et al., 2023)
6	Evolutionary game model + numerical simulation (Matlab)	(He et al., 2021)
7	Cluster analysis + multi-group structural equation model (MGA)	(Oktaviani et al., 2024)
8	Fixed effect model	(Peng et al., 2023)
9	PLS-SEM analysis	(Wang et al., 2025)
10	Double experimental design	(Long et al., 2024)
11	Centralized and decentralized game model	(Gao et al., 2025)
12	Double difference method (DID)	(Wang et al., 2024)
13	Benefit-cost sharing contract design	(Mu et al., 2021)
14	Game model + numerical simulation	(Wang et al., 2023)
15	Text mining + deep learning sentiment analysis	(Huang et al., 2022)
16	Stated preference (SP) experiment	(Liu et al., 2024)
17	PLS-SEM (402 questionnaires)	(Wang & Li, 2024)
18	Eye tracking + questionnaire survey dual method	(Najafabadiha et al., 2025)
19	Transfer learning + text mining	(Na et al., 2024)

Research Trends and Future Directions

Building on these findings, this study proposes the following avenues to advance e-commerce green purchasing behavior:

Firstly, Future work should systematically test mainstream theories within diverse cultural settings to uncover boundary conditions and to develop indigenous theoretical refinements that better capture local consumption norms and regulatory environments (Randall et al., 2024).

Then, as social commerce and livestreaming increasingly shape purchase pathways (Long et al., 2024). Scholars should investigate unique platform affordances—such as interactive gamification, influencer credibility heuristics, and real-time feedback loops—and their differential impact on green intentions and behaviors.

Next, building longitudinal designs to track how macro-shocks (pandemics, supply disruptions, carbon pricing) alter consumer affective–cognitive dynamics will be crucial (Mei et al., 2023). In particular, integrating real-time behavioral data can illuminate adaptive shifts in green purchasing under volatility.

Meanwhile, the convergence of AI-driven analytics and traditional survey/experimental methods promises richer insights. Future studies should exploit machine-learning models on large e-commerce datasets to detect latent consumer segments, forecast green demand, and personalize interventions (AlNuaimi et al., 2021). Moreover, embedding physiological measures into field experiments can deepen our understanding of subconscious drivers.

Finally, translating theoretical and empirical insights into scalable interventions—such as nudge-based prompts, green certification labels, or dynamic pricing mechanisms—requires rigorous impact evaluation. Collaborations with platforms and policymakers will enable field trials that assess both consumer uptake and environmental outcomes.

CONCLUSION

This study synthesises research evidence from 2021–2025 through the TCCM framework and offers two principal contributions. Theoretically, it refines green-purchase models by demonstrating how consumer cognition and platform mechanisms co-evolve across diverse e-commerce settings and by unifying behavioral, content, and methodological dimensions into a single analytical schema. Methodologically, it advocates for longitudinal designs to capture the temporal dynamics of eco-friendly decision making and calls for comprehensive ethical guidelines to govern AI-driven interventions. Practically, our findings equip platform designers and marketers with strategies for culturally sensitive nudges—such as algorithmic personalization and policy-aligned product framing—and provide policymakers and technologists with an interdisciplinary roadmap, integrating behavioral economics, computational optimization, and neuroscience, to foster scalable, low-carbon digital marketplaces.

In summary, e-commerce consumers' green purchasing behavior is underpinned by diverse theoretical lenses—from signaling and planned behavior theories to game-theoretic and para-social interaction models, highlighting both established mechanisms and novel adaptations. Contextual factors (platform type, product framing, regional policies) and consumer characteristics (affective, cognitive, demographic) jointly shape green purchase decisions, while methodological pluralism ensures robust insights. Going forward, integrating culturally sensitive theory testing, platform-specific studies, and big-data analytics will be key to advancing both scientific understanding and practical interventions in this rapidly evolving field.

Ethical Considerations

This study did not involve human or animal subjects. The authors declare that there are no potential conflicts of interest for the research, authorship, and/or publication of this article.

REFERENCES

1. AlNuaimi, B. K., Khan, M., & Ajmal, M. M. (2021). The role of big data analytics capabilities in greening e-procurement: A higher order PLS-SEM analysis. *Technological Forecasting and Social Change*, 169. <https://doi.org/10.1016/j.techfore.2021.120808>
2. Bar, D., Feuerriegel, S., Li, T., & Weinmann, M. (2023). Message framing to promote solar panels. *Nature Communications*, 14(1), 7187. <https://doi.org/10.1038/s41467-023-42904-0>

3. Fu, S., Liu, X., Lamrabet, A., Liu, H., & Huang, Y. (2022). Green production information transparency and online purchase behavior: Evidence from green agricultural products in China. *Frontiers in Environmental Science*, 10. <https://doi.org/10.3389/fenvs.2022.985101>
4. Gao, R., Hua, K., Wang, X., & Wei, J. (2025). Analysis of green e-commerce supply chain considering delivery time under reward–penalty mechanism based on confidence level. *Socio-Economic Planning Sciences*, 99, 102203. <https://doi.org/10.1016/j.seps.2025.102203>
5. He, H., Zhang, S., & Zhu, L. (2021). Green Product Quality Supervision Strategy in Online Shopping With Consumer Evaluation and Complaint. *Frontiers in Environmental Science*, 9. <https://doi.org/10.3389/fenvs.2021.702151>
6. Huang, H., Long, R., Chen, H., Sun, K., & Li, Q. (2022). Exploring public attention about green consumption on Sina Weibo: Using text mining and deep learning. *Sustainable Production and Consumption*, 30, 674–685. <https://doi.org/10.1016/j.spc.2021.12.017>
7. Jacobsen, L. F., Pedersen, S., & Thøgersen, J. (2022). Drivers of and barriers to consumers' plastic packaging waste avoidance and recycling – A systematic literature review. *Waste Management*, 141, 63–78. <https://doi.org/10.1016/j.wasman.2022.01.021>
8. Li, Q., Qian, T., Long, R., & Sun, C. (2025). How “symbiosis” influences the connected response of group purchasing behavior in green housing? *Journal of Cleaner Production*, 511, 145608. <https://doi.org/10.1016/j.jclepro.2025.145608>
9. Liu, M., Zhu, J., Yang, X., Chen, D., & Lin, Y. (2024). From Green Awareness to Green Behavior: The Impact of Information Disclosure Scenarios on Greener Shopping Channel Choices. *Sustainability*, 16(18), 7944. <https://doi.org/10.3390/su16187944>
10. Long, R., Yuan, X., & Wu, M. (2024). Consumers' green product purchase intention considering para-social interaction: An experimental study based on live-streaming e-commerce. *Journal of Cleaner Production*, 481, 144169. <https://doi.org/10.1016/j.jclepro.2024.144169>
11. Mei, L., Sun, L., Zhang, P., & Li, W. (2023). The Impact of Carbon Label Information Transmission on Consumer's Green Purchasing Behavior-Evidence from Eye Movement Tracking Experiment. *Forestry Economics*, 05, 75–96. <https://doi.org/10.13843/j.cnki.lyjj.20230712.001>
12. Mu, Z., Zheng, Y., & Sun, H. (2021). Cooperative Green Technology Innovation of an E-Commerce Sales Channel in a Two-Stage Supply Chain. *Sustainability*, 13(13), 7499. <https://doi.org/10.3390/su13137499>
13. Na, J., Long, R., Chen, H., Ma, W., Huang, H., Wu, M., & Yang, S. (2024). Sentiment analysis of online reviews of energy-saving products based on transfer learning and LBBA model. *Journal of Environmental Management*, 360, 121083. <https://doi.org/10.1016/j.jenvman.2024.121083>
14. Najafabadiha, A., Wang, Y., Gholizadeh, A., Javanmardi, E., & Zameer, H. (2025). Fostering consumer engagement in online shopping: Assessment of environmental video messages in driving purchase intentions toward green products. *Journal of Environmental Management*, 373, 123637. <https://doi.org/10.1016/j.jenvman.2024.123637>
15. Oktaviani, R. D., Naruetharadhol, P., Padthar, S., & Ketkaew, C. (2024). Green Consumer Profiling and Online Shopping of Imperfect Foods: Extending UTAUT with Web-Based Label Quality for Misshapen Organic Produce. *Foods*, 13(9), 1401. <https://doi.org/10.3390/foods13091401>
16. Peng, J., Li, K., & Gao, Y. (2022). How the Internet Affects China's Green Consumption Development: Empirical Research Based on Baidu Index Data. *Sustainability*, 15(1), 50. <https://doi.org/10.3390/su15010050>
17. Purcărea, T., Ioan-Franc, V., Ionescu, Ș.-A., Purcărea, I. M., Purcărea, V. L., Purcărea, I., Mateescu-Soare, M. C., Platon, O.-E., & Orzan, A.-O. (2022). Major Shifts in Sustainable Consumer Behavior in Romania and Retailers' Priorities in Agilely Adapting to It. *Sustainability*, 14(3), 1627. <https://doi.org/10.3390/su14031627>
18. Randall, T., Cousins, A. L., Neilson, L., Price, M., Hardman, C. A., & Wilkinson, L. L. (2024). Sustainable food consumption across Western and Non-Western cultures: A scoping review considering the theory of planned Behaviour. *Food Quality and Preference*, 114, 105086. <https://doi.org/10.1016/j.foodqual.2023.105086>
19. Shao, J., Feng, Y., & Liu, Z. (2024). The Impact of Big Data-Driven Strategies on Sustainable Consumer Behaviour in E-Commerce: A Green Economy Perspective. *Sustainability*, 16(24), 10960. <https://doi.org/10.3390/su162410960>

20. Sharma, K., Aswal, C., & Paul, J. (2023). Factors affecting green purchase behavior: A systematic literature review. *Business Strategy and the Environment*, 32(4), 2078–2092. <https://doi.org/10.1002/bse.3237>
21. Wang, C., Liu, J., & Fan, R. (2023). Promotion strategies for environmentally friendly packaging: a stochastic differential game perspective. *International Journal of Environmental Science and Technology*, 20, 7559–7568.
22. Wang, J., Wu, H., Liu, Y., & Wang, W. (2024). Health welfare in the digital era: Exploring the impact of digital trade on residents' health. *Economics & Human Biology*, 54, 101414. <https://doi.org/10.1016/j.ehb.2024.101414>
23. Wang, X., & Li, Y. (2023). Comparing influencing factors of online and offline fresh food purchasing: consumption values perspective. *Environment, Development and Sustainability*, 26(5), 12995–13015. <https://doi.org/10.1007/s10668-023-04056-5>
24. Wang, X., Peng, M., Li, Y., Ren, M., Ma, T., Zhao, W., & Xu, J. (2025). How E-Commerce Product Environmental Information Influences Green Consumption: Intention–Behavior Gap Perspective. *Sustainability*, 17(6), 2337. <https://doi.org/10.3390/su17062337>
25. Wattoo, M. U., Du, J., Zhou, J., Jose, S., & Piccardi, P. (2025). Exploring green purchase behavior in online agricultural markets: a multi-phase consumer decision model. *British Food Journal*. <https://doi.org/10.1108/BFJ-11-2024-1134>
26. Wijekoon, R., & Sabri, M. F. (2021). Determinants That Influence Green Product Purchase Intention and Behavior: A Literature Review and Guiding Framework. *Sustainability*, 13(11), 6219. <https://doi.org/10.3390/su13116219>