

**ORIGINAL ARTICLE**

Challenges in Adopting Sustainable Packaging Practices in Malaysian E-Commerce

Barbara Anak Dieo, *Tang Xing Rui, Cherry Ling Yieng Siang and Khatijah Binti Hanapi

¹School of Computing and Creative Media, University of Technology Sarawak, 96000 Sibu, Sarawak, Malaysia

ABSTRACT - The rapid growth of Malaysia's e-commerce sector has contributed to a surge in packaging waste, raising urgent concerns about its environmental impact and underscoring the critical need for sustainable packaging solutions. This study investigates the primary challenges faced by Malaysian e-commerce businesses in adopting sustainable packaging practices. A mixed-methods approach was employed, combining quantitative data from 220 survey respondents with qualitative insights gathered through interviews with e-commerce consumers and industry stakeholders. Findings reveal several significant barriers to the adoption of sustainable packaging. These include the high cost of eco-friendly materials, limited availability of sustainable packaging options, and fragmented recycling infrastructure that fails to support efficient waste management. Consumer behavior also plays a key role, with many prioritising convenience, cost, and aesthetics over environmental responsibility, creating a gap between environmental awareness and actual sustainable practices. Additionally, the lack of clear regulatory frameworks and incentives has further slowed industry-wide transition, particularly for small and medium-sized enterprises facing financial and operational constraints. Despite increasing awareness of environmental issues among consumers and industry players, systemic change remains limited. The study highlights the need for coordinated efforts, including stronger regulatory support, public education campaigns, financial incentives for businesses, and investment in recycling infrastructure. These measures are essential for accelerating the shift toward sustainable packaging within Malaysia's e-commerce ecosystem.

ARTICLE HISTORY

Received: 10 Oct 2025

Revised: 17 Dec 2025

Accepted: 19 Mar 2026

KEYWORDS

*E-commerce,
Environmental
Challenges,
Packaging Waste,
Sustainable
Packaging,
Waste Management.*

INTRODUCTION

The rapid expansion of e-commerce in Malaysia has transformed consumer purchasing behavior, positioning online shopping as a dominant mode of consumption. While this shift offers convenience and accessibility, it has also intensified environmental concerns related to packaging waste. E-commerce transactions typically require protective packaging such as plastic wraps, corrugated cardboard boxes, and cushioning materials, many of which are discarded immediately after unboxing. As a result, packaging waste has become a significant contributor to Malaysia's growing solid waste problem [1].

Globally, e-commerce packaging waste has been identified as a critical environmental challenge due to its scale, material intensity, and short usage lifespan [1]. In Malaysia, more than one-third of household waste consists of plastic materials, with a substantial portion originating from e-commerce packaging [2]. Alarmingly, national recycling rates remain low, highlighting systemic weaknesses in waste management infrastructure and public participation [2].

This issue is closely aligned with Sustainable Development Goal (SDG) 12: Responsible Consumption and Production, which emphasizes waste prevention, recycling, and resource efficiency [3]. Despite growing awareness, consumer disposal behavior has shown limited improvement, indicating a persistent gap between environmental concern and actual sustainable practices. Previous studies suggest that

*Corresponding Author: Tang Xing Rui. University of Technology Sarawak (UTS), email: bid22090001@student.uts.edu.my

convenience, cost sensitivity, and lack of infrastructure often outweigh environmental considerations in consumer decision-making [4].

A major challenge in e-commerce packaging lies in the frequent use of mixed materials, such as plastic poly mailers combined with corrugated cardboard inserts. These material combinations complicate sorting processes and reduce recycling efficiency [5]. Furthermore, over packaging remains common as sellers attempt to prevent product damage during delivery, particularly in logistics systems with inconsistent handling quality [6]. While corrugated cardboard is recyclable and reusable, its environmental benefits are often undermined by excessive use and contamination with plastic components [7].

Additionally, the dominance of non-biodegradable plastics exacerbates environmental risks. Plastics commonly used in e-commerce packaging degrade slowly and contribute to long-term pollution. Although cardboard packaging offers a more sustainable alternative, its durability requirements for protecting goods during transit often result in thicker, heavier designs that increase material consumption and transportation emissions [8]. These conflicting functional and environmental demands highlight the complexity of transitioning toward sustainable packaging solutions.

MATERIALS AND METHODOLOGY

This study employed a mixed-methods approach to gather comprehensive data on the challenges related to adopting sustainable packaging in Malaysian e-commerce.

Quantitative Data Collection

The quantitative component of this research was conducted through an online survey using Google Forms. The survey was designed to collect data from e-commerce consumers in Malaysia who frequently engaged in online shopping. The questionnaire gathered insights into consumers' awareness, attitudes, and behaviors regarding sustainable packaging. It also explored factors influencing packaging disposal and recycling practices. The survey consisted of multiple-choice, Likert-scale, and open-ended questions.

The survey was distributed through various online platforms, including Instagram, WhatsApp, Reddit, and Facebook, targeting a diverse demographic of online shoppers across different age groups, occupations, and geographical regions within Malaysia. A pilot test was conducted with 20 respondents to ensure clarity and improve the reliability of the questionnaire. Based on the feedback received, necessary adjustments were made before deploying the full-scale survey to a final sample of approximately 220 respondents. Descriptive statistics and cross-tabulation analyses were conducted using Microsoft Excel to interpret the data.

Qualitative Data Collection

The qualitative method involves semi-structured interviews with four selected key stakeholders in the Malaysian e-commerce sector including business owners, packaging suppliers, and environmental advocates. These interviews aim to gather in-depth perspectives on the challenges and opportunities related to sustainable packaging solutions. Face-to-face interviews was preferred. However, online interviews was conducted where geographical or time constraints arise. Each interview recorded and transcribed for further analysis. Thematic analysis applied to identify common themes, challenges, and opportunities, allowing for the synthesis of qualitative data to support the development of practical, sustainable packaging strategies.

RESULTS AND DISCUSSION

This section presents a consolidated discussion based on quantitative survey data from 220 respondents and qualitative insights from four interviewees. The survey sample size of 220 respondents is considered adequate for identifying general trends and patterns in consumer perceptions and behaviors related to sustainable packaging in Malaysian e-commerce. The respondents, who were active e-commerce users in Malaysia, provided relevant and diverse perspectives aligned with the study's objectives. Furthermore, the integration of quantitative and qualitative findings provided a multidimensional understanding of the challenges hindering sustainable packaging practices in Malaysian e-commerce.

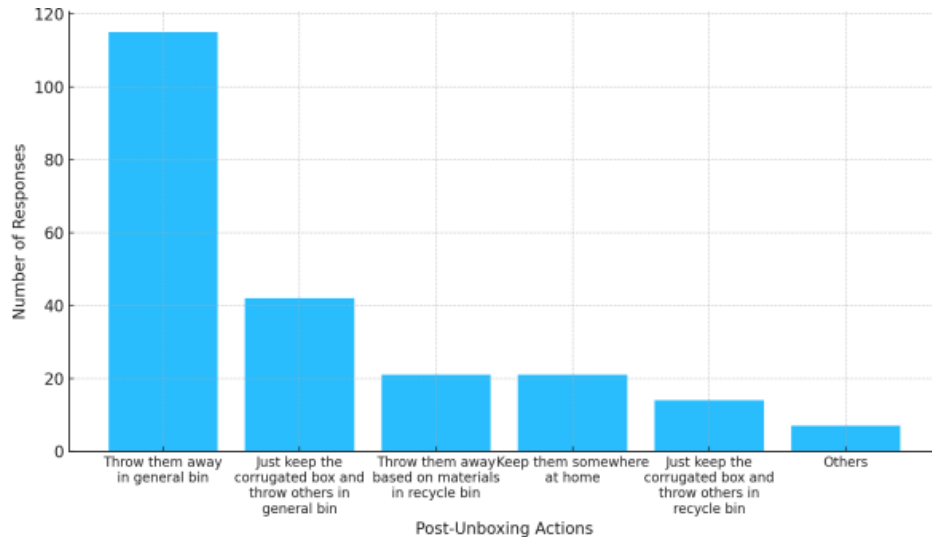


Figure 1. Action taken with E-commerce packaging after unboxing.

Figure 1 showed that 52% of respondents discarded e-commerce packaging in general waste bins, while only 9.5% recycled packaging appropriately. Reuse behavior was selective; for example, 42 respondents reported retaining only corrugated cardboard boxes while discarding plastic mailers and bubble wrap. Interviewees corroborated these findings, noting that reuse behavior was often driven by cost-saving considerations rather than environmental awareness. One interviewee highlighted that excessive plastic usage, particularly for overseas shipping, was largely attributed to poor handling practices by logistics providers. These findings align with existing literature highlighting low recycling participation and limited reuse behavior in e-commerce contexts [1].

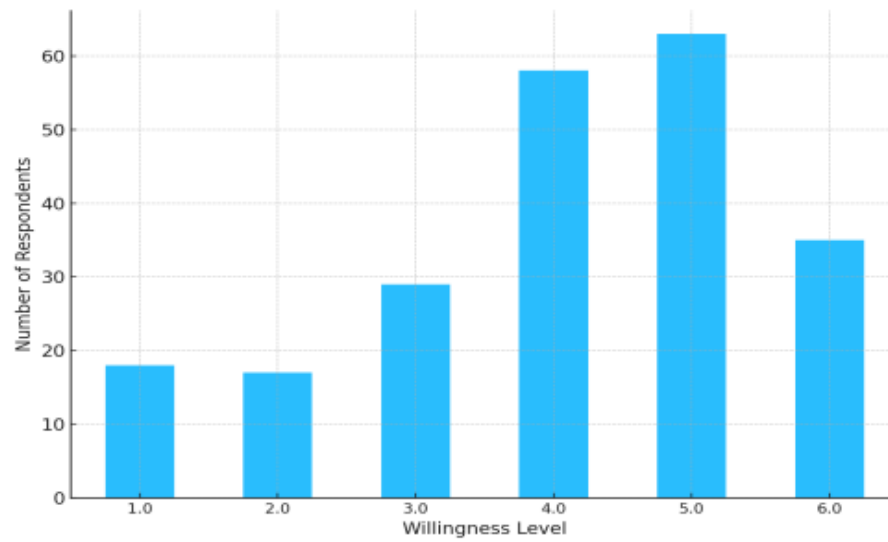


Figure 2. Willingness to reuse E-commerce packaging.

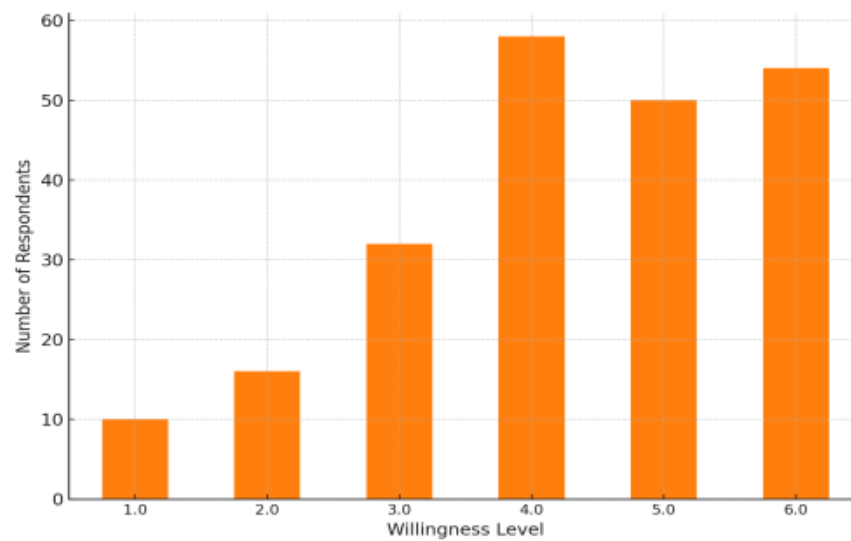


Figure 3. Willingness to recycle E-commerce packaging.

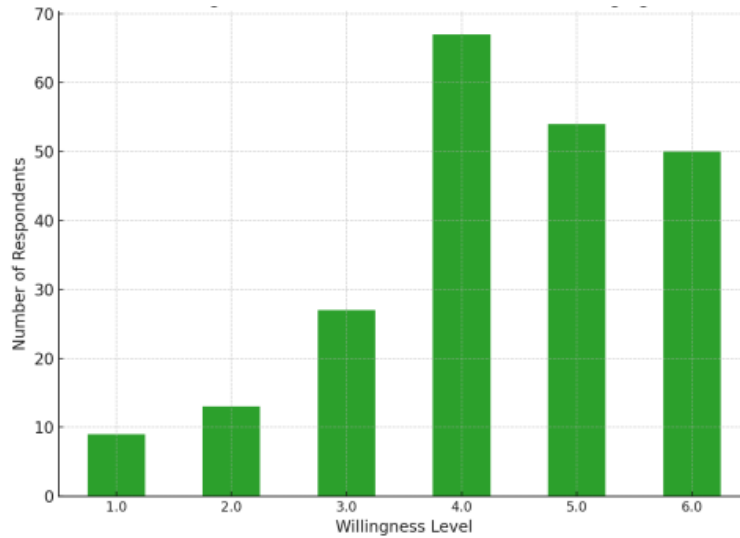


Figure 4. Willingness to reduce the usage of E-commerce packaging.

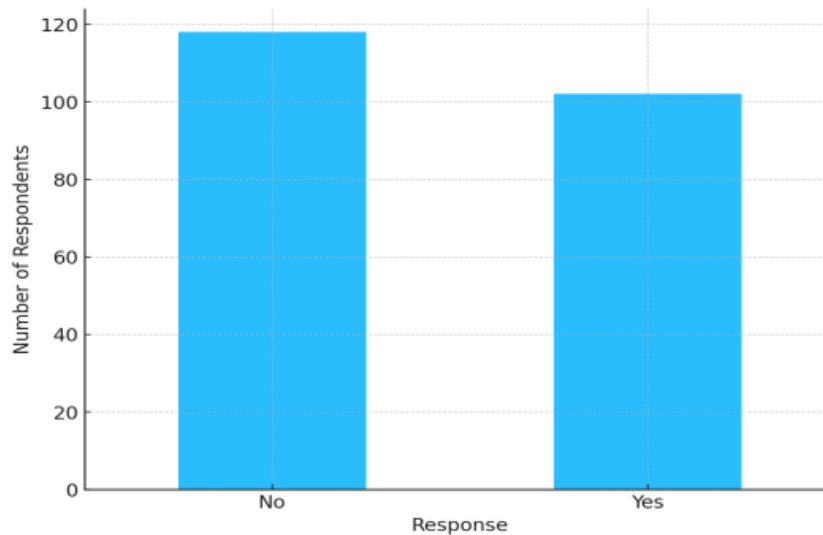


Figure 5. Reusage of E-commerce packaging.

Figure 2 showed that 70.9% of respondents reported willingness to reuse packaging, while Figure 3 indicated that 73.6% were willing to recycle, and Figure 4 showed that 77.7% were willing to reduce packaging usage. However, Figure 5 revealed that only 46.4% of respondents actually reused packaging materials. This discrepancy highlights an intention–action gap in sustainable consumption behavior. Interviewees attributed this gap to factors such as limited access to recycling facilities, insufficient environmental education, and entrenched convenience-oriented habits. Several interviewees noted that many consumers perceived packaging disposal as the responsibility of businesses or municipal authorities rather than individuals. This observation is consistent with existing literature on attitude–behavior gaps in environmental decision-making [6].

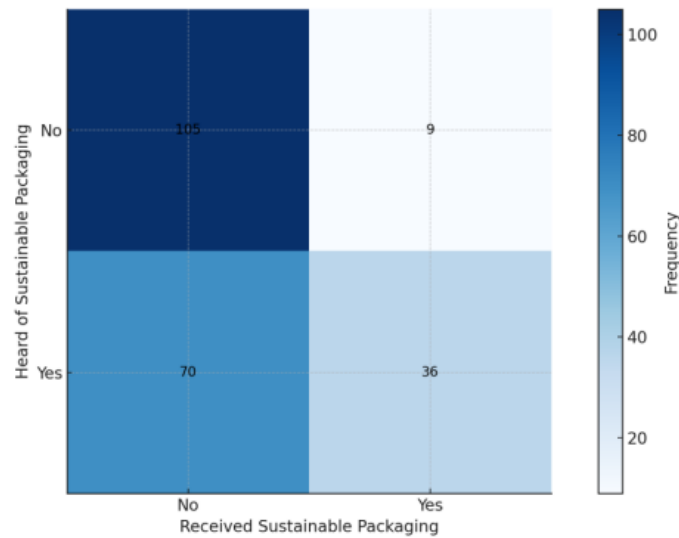


Figure 6. Interplay between awareness and receipt of sustainable E-commerce packaging.

Figure 6 showed that although 48.2% of respondents were aware of sustainable packaging, only 16.4% had received sustainable packaging in actual e-commerce transactions. This finding indicates a visibility gap between sustainability messaging and real-world implementation. Interviewees reinforced this observation, stating that sustainable packaging options were rarely available during the checkout process and were typically offered only by niche or environmentally conscious sellers. Positive experiences with biodegradable and reusable materials, such as beeswax wraps and recycled boxes, were mostly associated with small businesses that communicated sustainability clearly. Conversely, clear communication and functional design were identified as critical factors influencing consumer acceptance and reuse, consistent with findings on packaging design and structural performance [8].

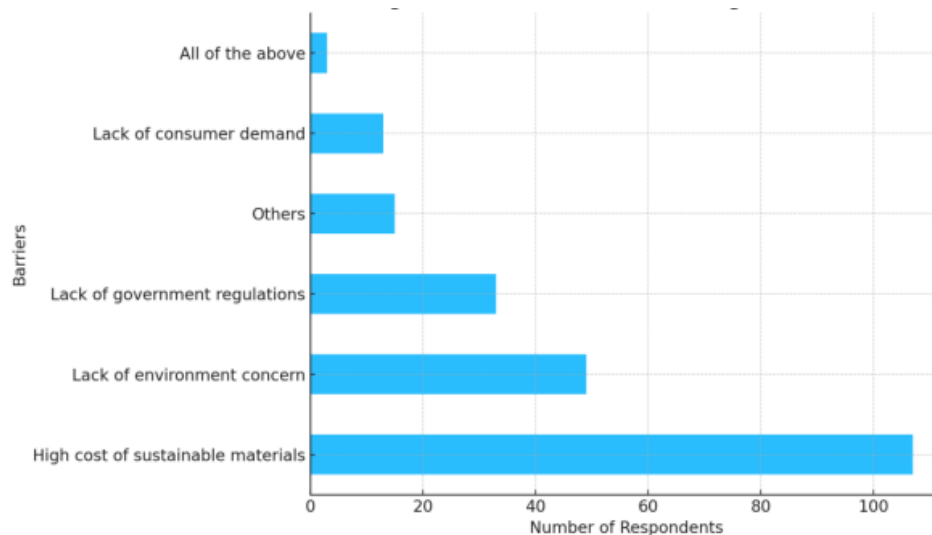


Figure 7. Barriers preventing E-commerce sector from using sustainable packaging.

Figure 7 showed that 48.6% of respondents identified high costs as the primary barrier to adopting sustainable packaging. Other barriers included lack of environmental concern (22.3%), absence of regulatory enforcement (15.0%), and weak consumer demand (5.9%). Interviewees described instances where sellers overpackaged products to minimize damage-related complaints, particularly for fragile goods. Sustainable alternatives were perceived as less durable or cost-effective, especially for small and medium-sized enterprises (SMEs). Without financial incentives, subsidies, or supportive policy frameworks, SMEs faced significant challenges in transitioning away from conventional plastic packaging [7].

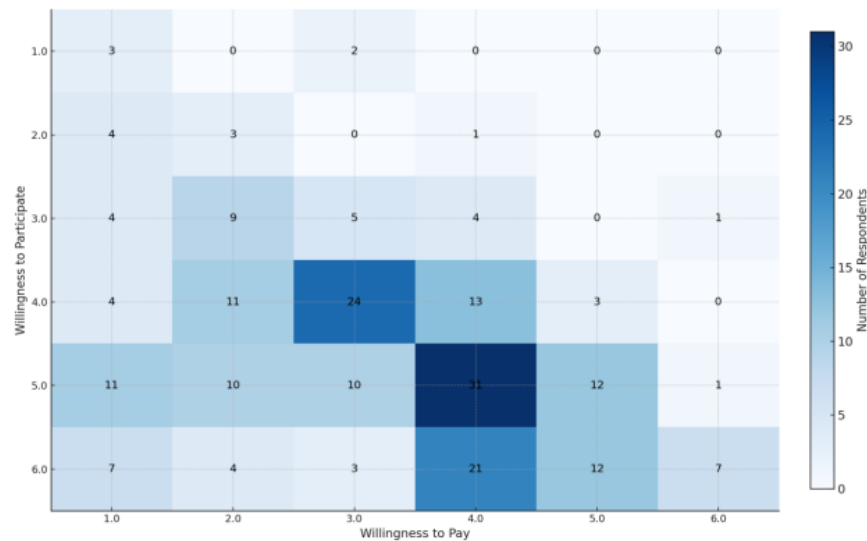


Figure 8. Interplay between willingness to participate and pay more for sustainable packaging.

Figure 8 showed that only 14.1% of respondents who expressed high willingness to adopt sustainable practices were willing to pay additional costs for sustainable packaging. Interviewees suggested that the financial burden of sustainable packaging should be shared between businesses and governing bodies through mechanisms such as tax incentives. This finding highlights a perceived misalignment of responsibility, where consumers expected businesses to lead sustainability initiatives without bearing additional personal costs. Similar patterns have been observed in studies examining demographic and economic factors influencing reuse and recycling behaviors [3].

CONCLUSION

The adoption of sustainable packaging in Malaysia's e-commerce sector faces multiple challenges. While awareness of sustainability is growing, actual implementation remains limited due to financial, operational, and systemic constraints. This study highlights that meaningful progress requires collaboration across the supply chain. Government policy, business innovation, and consumer education must work in unison to support Malaysia's goal of reducing packaging waste and achieving SDG 12. With clear direction, incentives, and support structures, the e-commerce industry has the potential to transition toward a more sustainable future.

ACKNOWLEDGEMENT

This study was conducted as part of the Bachelor of Arts in Industrial Design program at the University of Technology Sarawak (UTS). The author would like to acknowledge the University of Technology Sarawak for providing the academic environment, facilities, and resources that supported the completion of this research.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

REFERENCES

- [1] Escursell, S., Llorach-Massana, P., & Roncero, M. B. (2021). Sustainability in e-commerce packaging: A review. *Journal of Cleaner Production*, 280, 124314. <https://doi.org/10.1016/j.jclepro.2020.124314>.
- [2] Mokhtar, N. F., & Shamsuddin, M. S. (2024). E-Commerce packaging waste in Malaysia – where does it all end up? *PaperAsia*, 40(4b), 254–265. <https://doi.org/10.59953/paperasia.v40i4b.138>.
- [3] United Nations. (2015). Transforming our world: The 2030 Agenda for Sustainable Development. United Nations General Assembly. <https://sdgs.un.org/2030agenda>.
- [4] Farooq, H., Majid, M. B., & Ahmed, H. (2022). E-Commerce Adoption: Enablers within Small and Medium-Sized Enterprises in Punjab. *Global Management Sciences Review*, VIII(IV), 54-69. [https://doi.org/10.31703/gmsr.2023\(VIII-I\).04](https://doi.org/10.31703/gmsr.2023(VIII-I).04).
- [5] Gupta, L., Chirla, S. R., Singla, N., & Arora, T. (2023). Product packaging by e-commerce platforms: Impact of COVID-19 and proposal for circular model to reduce the demand of virgin packaging. *Circular Economy and Sustainability*, 3, 1255–1273. <https://doi.org/10.1007/s43615-022-00231-4>.
- [6] Ketkale, H., & Simske, S. (2023). A LifeCycle Analysis and Economic Cost analysis of corrugated cardboard box reuse and recycling in the United States. *Resources*, 12(2), 22. <https://doi.org/10.3390/resources12020022>.
- [7] Ketkale, H., & Simske, S. (2023). Demographic considerations in incenting reuse of corrugated cardboard boxes. *Sustainability*, 15(15), 11600. <https://doi.org/10.3390/su151511600>.
- [8] Zang, S., Xu, L., & Sun, H. (2021). Research on compressive strength of high strength corrugated box based on finite element analysis. *Integrated Ferroelectrics*, 213(1), 21–34. <https://doi.org/10.1080/10584587.2020.1728730>.