International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 09 Issue: 04 | April - 2025 SJIF Rating: 8.586 ISSN: 2582-3930

"Sustainable & Reusable Packaging Solutions for E-Commerce"

Dr. Gayathri R [1], Maahi Pal [2,] Naresh D Choudhary [3], Rajshree [4], Alakh Kulshrestha [5], Manasa.R [6], Nikshith G S [7].

[1] Professor. CMS Business School, JAIN (Deemed-to-be University), Bangalore, India. 560009

[2,3,4,5,6,7] MBA, 2024-26, Faculty of Management Studies, CMS Business School, JAIN (Deemed-to-be University), Bangalore India. 560009

ABSTRACT

The increasing environmental degradation caused by non-biodegradable packaging waste has compelled industries and consumers to seek sustainable alternatives. This research investigates the current awareness, attitudes, and behavior of consumers toward sustainable packaging in the Indian context. With environmental sustainability gaining momentum globally, the shift toward eco-friendly packaging is not only a necessity but also an opportunity for businesses to align with consumer expectations and regulatory standards.

The study adopts a quantitative research methodology, using a structured questionnaire circulated via Google Forms to gather primary data. Responses were collected from over 50 individuals across diverse age groups, educational backgrounds, and income levels. The analysis reveals a high level of awareness among consumers about the harmful effects of plastic packaging on the environment. A majority of respondents showed a positive inclination towards purchasing products with sustainable packaging, particularly if such options were affordable and easily accessible.

Key findings highlight a gap between consumer intention and actual behavior, largely influenced by price sensitivity, limited market availability of sustainable packaging, and insufficient knowledge about eco-friendly materials. Interestingly, younger demographics exhibited stronger preferences and readiness to adapt to sustainable alternatives, emphasizing the role of education and social awareness in influencing consumer behavior.

The research further explores industry implications, suggesting that companies adopting sustainable packaging not only contribute to environmental conservation but also enhance their brand image and consumer trust. Policymakers are encouraged to incentivize businesses and educate consumers to promote a circular economy.

Overall, the paper concludes that while consumer support for sustainable packaging is growing, achieving mass adoption will require collaborative efforts among manufacturers, policymakers, and consumers. Enhanced awareness, affordability, and accessibility of sustainable options remain crucial to fostering long-term behavioural change.

INTRODUCTION

In contemporary industries, sustainability has emerged as a key concern, prompting companies to reconsider their procedures and develop novel approaches that lessen their negative effects on the environment. Packaging waste is one of the most urgent issues since it greatly increases pollution and depletes resources. Although they have long been practical for businesses, traditional packaging materials like plastic and non-recyclable composites present serious environmental risks. Businesses are now looking at sustainable solutions that strike a balance between environmental responsibility and financial viability as consumer awareness rises and regulatory demands increase.

This study explores the possibilities of eco-friendly and reusable packaging options, assessing their viability, affordability, and long-term advantages. The study looks at customer preferences, material advancements, and market trends to find workable ways for companies to switch to sustainable packaging without sacrificing operational effectiveness. Industries have a rare chance to embrace change, lower their carbon footprint, and create a more responsible future as a result of the growing demand for green alternatives.

REVIEW OF LITERATURE

Sustainable packaging has gained increasing attention from researchers, industry experts, and policymakers due to its critical role in addressing environmental concerns. The literature on sustainable packaging explores various aspects, including material innovation, consumer perception, regulatory influence, and economic feasibility. This review synthesizes key findings from existing studies to provide a comprehensive understanding of sustainable packaging trends, challenges, and opportunities.

1. Evolution of Sustainable Packaging

The concept of sustainable packaging has evolved significantly over the decades. Early research focused on reducing packaging waste through material efficiency and lightweighting (Verghese et al., 2012). However, recent studies emphasize the importance of circular economy principles, which promote the use of biodegradable, recyclable, and reusable materials (Ellen MacArthur Foundation, 2016). Researchers argue that shifting from linear production models to closed-loop systems can significantly reduce waste and resource consumption (Lacy & Rutqvist, 2015).

2. Materials and Innovations in Sustainable Packaging

A substantial body of literature examines alternative materials for packaging. Traditional plastic packaging, derived from fossil fuels, has been criticized for its environmental impact (Hopewell et al., 2009). In response, research has focused on biodegradable polymers such as polylactic acid (PLA), polyhydroxyalkanoates (PHA), and starch-based plastics, which decompose naturally without leaving harmful residues (Babu et al., 2013). Studies also explore plant-based materials like bamboo, molded pulp, and mycelium-based packaging, which offer sustainable alternatives with comparable strength and durability (Havstad, 2020).

Another emerging trend is edible packaging, where researchers investigate materials derived from seaweed, rice, and protein films as potential solutions to single-use waste (Song et al., 2018). Additionally, smart packaging technologies, such as QR codes and embedded sensors, are being explored to enhance recyclability and track the life cycle of packaging materials (Mihindukulasuriya & Lim, 2014).

3. Consumer Perception and Market Trends

Consumer preferences play a crucial role in the adoption of sustainable packaging. Multiple studies indicate a rising demand for eco-friendly packaging, with consumers willing to pay a premium for products that align with their environmental values (Magnier & Crié, 2015). However, some research highlights the "attitude-behavior gap," where consumers express concern for sustainability but may not always translate it into purchasing behavior due to cost or convenience factors (White et al., 2019).

Packaging aesthetics and labeling also influence consumer choices. Studies suggest that clear communication about sustainability credentials, such as "100% biodegradable" or "recyclable," increases consumer trust and willingness to engage in responsible disposal practices (Grunert et al., 2014). However, greenwashing—where companies falsely claim sustainability benefits—remains a challenge and can lead to consumer skepticism (TerraChoice, 2010).

4. Regulatory and Policy Influence on Sustainable Packaging

Governments worldwide have implemented regulations to promote sustainable packaging. The European Union's Circular Economy Action Plan and the U.S. Plastics Pact are examples of policy frameworks driving industry-wide adoption of eco-friendly practices (European Commission, 2020). Extended Producer Responsibility (EPR) policies mandate that

manufacturers take responsibility for packaging waste, encouraging the use of recyclable and compostable materials (OECD, 2018).

Studies indicate that regulatory pressure can accelerate corporate sustainability initiatives. For example, bans on single-use plastics in multiple countries have forced businesses to explore alternative solutions (UNEP, 2018). However, researchers also note that inconsistent global regulations create challenges for multinational companies, requiring them to adapt to varying compliance standards (Nakatani, 2021).

5. Economic and Business Implications on Sustainable Packaging

Cost remains a significant barrier to the large-scale adoption of sustainable packaging. Several studies discuss the high initial investment required for R&D, new manufacturing processes, and alternative materials (Pauer et al., 2019). However, long-term economic benefits, such as reduced material costs, waste management savings, and enhanced brand reputation, can outweigh initial expenditures (Lacy & Rutqvist, 2015).

Additionally, research highlights the role of corporate social responsibility (CSR) in driving sustainable packaging initiatives. Companies that integrate sustainability into their business models not only reduce environmental impact but also gain a competitive edge in the market (Porter & Kramer, 2011). Retail giants like Unilever and Nestlé have successfully leveraged sustainable packaging as part of their brand strategy, reinforcing the idea that sustainability and profitability can coexist (Smithers Pira, 2020).

6. Life Cycle Assessment (LCA) in Sustainable Packaging

Life Cycle Assessment (LCA) is widely used in research to evaluate the environmental impact of packaging materials from production to disposal. Studies suggest that assessing the entire life cycle, including raw material extraction, energy consumption, and end-of-life treatment, is essential for making informed sustainability decisions (Rebitzer et al., 2004). Findings indicate that while biodegradable materials may reduce landfill waste, they often require more energy-intensive production processes (Madival et al., 2009). Researchers emphasize the importance of balancing material choice with energy efficiency to achieve optimal sustainability outcomes (Siracusa et al., 2008).

7. Supply Chain and Logistics in Sustainable Packaging

Sustainable packaging extends beyond materials to include the supply chain and logistics. Research highlights that efficient packaging design can minimize transportation costs and carbon footprint by reducing weight and volume (Verghese & Lewis, 2007). Some companies are adopting collapsible and modular packaging to optimize storage and shipping efficiency (Pålsson et al., 2012). Furthermore, reverse logistics systems, where used packaging is collected and reintegrated into the supply chain, are gaining traction as a sustainable business model (Govindan et al., 2015).

8. Biodegradability vs. Recyclability: A Comparative Analysis

A critical debate in sustainable packaging literature revolves around whether biodegradability or recyclability is the superior approach. Some studies argue that biodegradable packaging reduces landfill accumulation and is ideal for food-related industries where contamination limits recyclability (Song et al., 2009). However, other research suggests that recyclable materials, such as PET and HDPE plastics, have a lower carbon footprint over multiple life cycles (Hopewell et al., 2009). The effectiveness of each strategy depends on local waste management infrastructure and consumer participation in recycling programs (Pires et al., 2011).

9. Challenges in Sustainable Packaging Adoption

Despite its benefits, implementing sustainable packaging faces multiple barriers. Research identifies high costs, supply chain complexities, and limited availability of alternative materials as major obstacles (Lindh et al., 2016). Additionally, resistance from stakeholders—such as manufacturers accustomed to traditional packaging—slows down adoption (Steenis

et al., 2017). Some studies suggest that policy incentives and consumer awareness campaigns can accelerate the transition by reducing cost disparities and fostering industry collaboration (Molina-Besch et al., 2019).

10. Future Trends and Emerging Technologies in Sustainable Packaging

The future of sustainable packaging is driven by advancements in materials science and digital technology. Researchers are exploring nanotechnology to create ultra-thin, high-strength biodegradable films that enhance food preservation (Silvestre et al., 2011). Artificial intelligence (AI) and blockchain are also being tested to improve waste tracking and enhance supply chain transparency (Francis et al., 2020). Studies predict that as circular economy initiatives gain global momentum, businesses will increasingly adopt closed-loop packaging solutions to minimize environmental impact and drive innovation (Geissdoerfer et al., 2017).

RESEARCH METHODOLOGY

1. Research Design

An exploratory research design is used in this study to look into the potential, problems, and trends in sustainable packaging. To guarantee a thorough grasp of the topic, the research integrates qualitative and quantitative methodologies. Primary research is carried out to gather empirical facts, and secondary research is used for theoretical analysis.

2. Data Collection Methods

Both primary and secondary data sources are employed to guarantee a comprehensive study:

Primary Data:

- **Surveys** – A structured questionnaire is designed to collect consumer insights on sustainable packaging preferences, awareness, and purchasing behavior.

  - **(Google Forms)** - To learn more about customer preferences, awareness, and purchasing patterns regarding sustainable packaging, a systematic questionnaire will be created and disseminated via Google Forms. In order to find patterns and relationships, the responses will undergo statistical analysis.

- **Interviews** – Industry experts, sustainability consultants, and packaging manufacturers are interviewed to gain insights into industry challenges and technological advancements.

- **Case Studies** – Real-world examples of companies adopting sustainable packaging (e.g., Unilever, Nestlé) are analysed to understand best practices.

Secondary Data:

- Peer-reviewed journal articles, industry reports, government policies, and company sustainability reports are reviewed to understand past research and market trends.

Data Analysis Techniques

Since **Google Forms** was used to collect survey responses, the data was automatically compiled into structured formats, making analysis more efficient. The following techniques were used to interpret the collected data:

1. **Descriptive Statistics**

   - The data was analysed using **percentages, mean, median, and mode** to identify key trends.

   - For example, the proportion of respondents preferring sustainable packaging over conventional packaging was calculated.

2. **Graphical Representation**

o Google Forms automatically generated **bar charts, pie charts, and line graphs**, which were further refined using Microsoft Excel for better visualization.

o These visuals helped in understanding consumer preferences, price sensitivity, and awareness of sustainable packaging.

3. **Categorization of Responses**

o Responses were segmented based on **age, gender, occupation, and frequency of purchase** to observe differences in preferences.

o This segmentation helped identify target customer groups that are more inclined toward sustainable packaging.

4. **Trend Analysis**

o The data was reviewed to detect patterns in consumer behavior, such as **which demographic groups are most willing to pay extra for sustainable packaging**.

o Insights from historical data (if any) were compared with current findings.

5. **Cross-tabulation**

o Cross-tabulation was used to compare multiple variables, such as **income level vs. willingness to buy sustainable packaging** or **education level vs. awareness of eco-friendly alternatives**.

o This method helped in understanding how different factors influence consumer choices.

6. **Thematic Analysis for Open-ended Questions**

o Open-ended responses were analysed using **word cloud tools** and categorized into key themes.

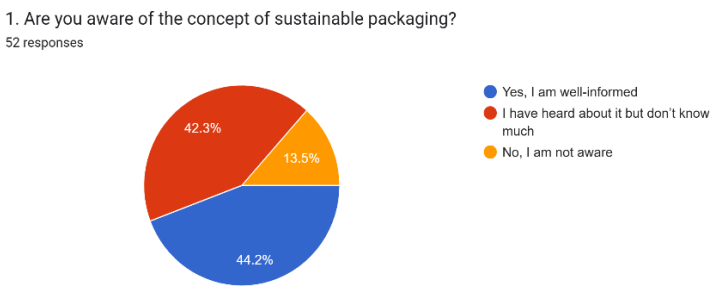
o Common phrases and ideas from respondents were grouped to understand consumer expectations, concerns, and preferences regarding sustainable packaging.

7. **Identifying Gaps and Opportunities**

o The findings were reviewed to highlight gaps in consumer knowledge, industry challenges, and potential areas for innovation.

o These insights provided a foundation for recommendations on improving sustainable packaging adoption.

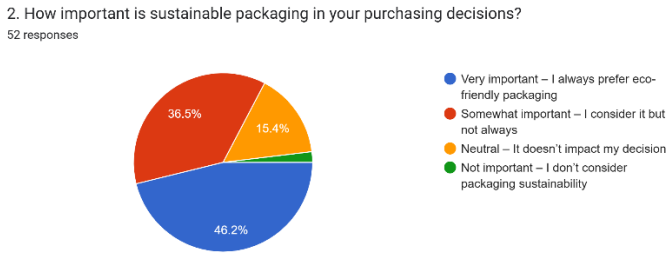
DATA ANALYSIS AND INTERPRETATION



The pie chart shows the level of awareness about sustainable packaging among 52 respondents.

- **44.2% are well-informed**, meaning they understand the concept.
- **42.3% have heard about it but don't know much**, indicating partial awareness.
- **13.5% are not aware at all**, showing a need for basic education on the topic.

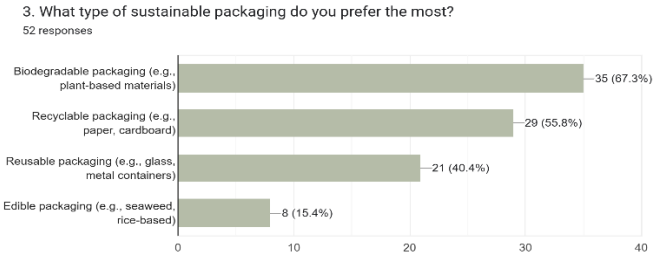
Overall, while most respondents have some level of awareness, nearly half lack detailed knowledge, highlighting the need for more education and awareness efforts.



The pie chart illustrates how important sustainable packaging is in purchasing decisions among 52 respondents.

- **46.2% consider it very important**, meaning they always prefer eco-friendly packaging.
- **36.5% find it somewhat important**, meaning they consider it but not always.
- **15.4% are neutral**, indicating packaging sustainability does not influence their decision.
- **A very small percentage does not consider packaging sustainability at all.**

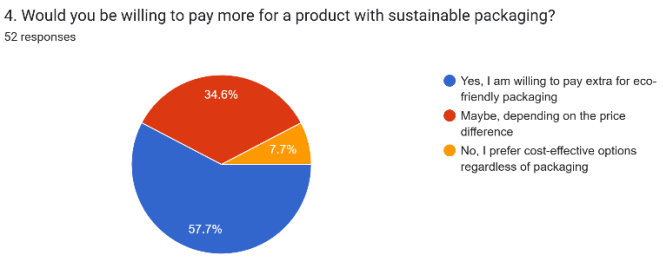
Overall, the majority (82.7%) value sustainable packaging to some extent, showing a strong preference for eco-friendly options in purchasing decisions.



The bar chart shows the preferred types of sustainable packaging among 52 respondents.

- **67.3% prefer biodegradable packaging** (e.g., plant-based materials), making it the most popular choice.
- **55.8% prefer recyclable packaging** (e.g., paper, cardboard).
- **40.4% prefer reusable packaging** (e.g., glass, metal containers).
- **15.4% prefer edible packaging** (e.g., seaweed, rice-based), the least chosen option.

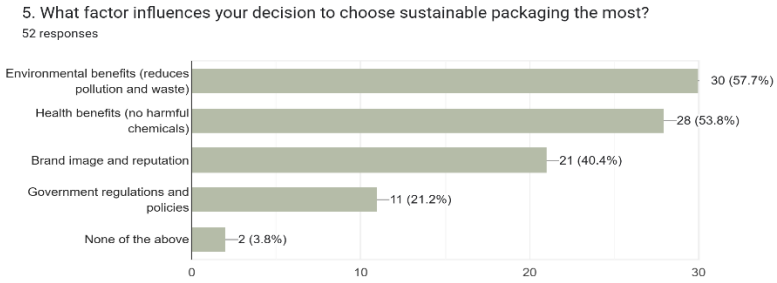
Overall, most respondents favor biodegradable and recyclable packaging, indicating a preference for materials that break down naturally or can be reused.



The pie chart illustrates respondents' willingness to pay more for products with sustainable packaging.

- **57.7% are willing to pay extra** for eco-friendly packaging.
- **34.6% might pay more**, depending on the price difference.
- **7.7% prefer cost-effective options**, regardless of packaging sustainability.

Overall, most respondents (over 90%) show some level of willingness to pay more for sustainable packaging, indicating strong consumer support for eco-friendly initiatives.



The bar chart shows the key factors influencing respondents' decisions to choose sustainable packaging.

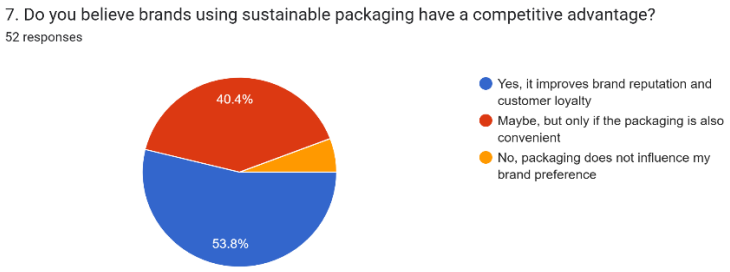
- **57.7% prioritize environmental benefits** (reducing pollution and waste).
- **53.8% consider health benefits** (avoiding harmful chemicals).
- **40.4% are influenced by brand image and reputation**.
- **21.2% consider government regulations and policies**.
- **3.8% are not influenced by any of these factors**.

Overall, environmental and health benefits are the biggest motivators, indicating that sustainability and well-being drive consumer choices.

The pie chart illustrates how respondents typically dispose of packaging waste.

- **25% always recycle or compost properly.**
- **30.8% try to recycle but not always.**
- **28.8% dispose of packaging as regular waste.**
- **15.4% do not pay attention to packaging disposal.**

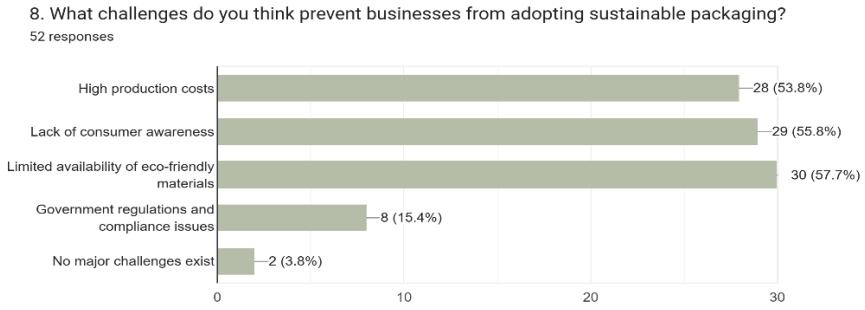
Overall, while more than half of the respondents attempt to recycle, a significant portion (44.2%) either throw packaging away as regular waste or do not consider disposal methods, highlighting a need for better recycling awareness and habits.



The pie chart illustrates respondents' opinions on whether brands using sustainable packaging have a competitive advantage.

- **53.8% believe it improves brand reputation and customer loyalty.**
- **40.4% think it matters only if the packaging is also convenient.**
- **A small 5.8% say packaging does not influence their brand preference.**

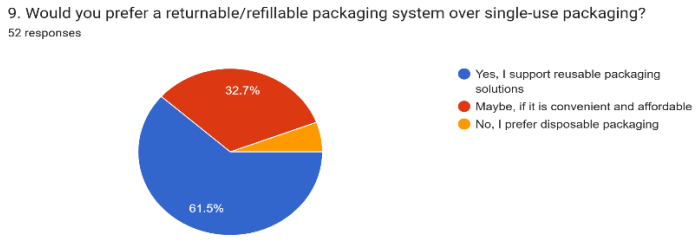
Overall, the majority of respondents recognize the competitive benefits of sustainable packaging, but convenience remains a key factor in consumer decisions.



The bar chart highlights the key challenges preventing businesses from adopting sustainable packaging.

- **57.7% cite the limited availability of eco-friendly materials** as the biggest challenge.
- **55.8% believe a lack of consumer awareness** is a major barrier.
- **53.8% point to high production costs** as a significant issue.
- **15.4% mention government regulations and compliance issues.**
- **3.8% believe no major challenges exist.**

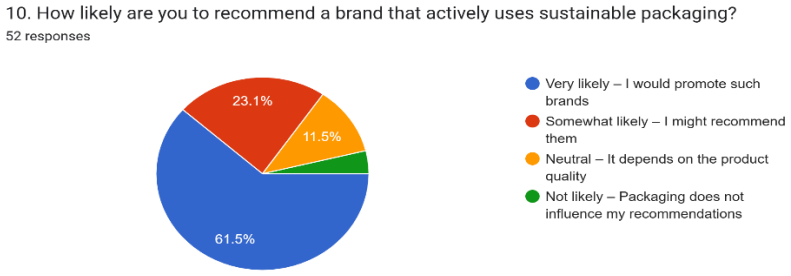
Overall, material availability, consumer awareness, and cost are the primary obstacles, suggesting that businesses need better access to sustainable materials and more consumer demand to drive adoption.



The pie chart shows preferences for returnable/refillable packaging over single-use packaging:

- **61.5% support reusable packaging solutions.**
- **32.7% might consider it if it's convenient and affordable.**
- **Only 5.8% prefer disposable packaging.**

This indicates strong consumer interest in sustainable packaging, with convenience and affordability being key factors in adoption.



The chart shows how likely people are to recommend brands that use sustainable packaging:

- **61.5% are very likely to promote such brands.**
- **23.1% are somewhat likely to recommend them.**
- **11.5% are neutral and base recommendations on product quality.**
- **Only 3.8% say packaging does not influence their recommendations.**

This suggests that most consumers value sustainable packaging and are willing to support brands that adopt it.

FINDINGS & SUGGESTIONS

Findings on Sustainable Packaging Awareness & Preferences:

1. **Awareness & Importance of Sustainable Packaging**

o 86.5% of respondents have some awareness of sustainable packaging, but 42.3% have only limited knowledge.

o 82.7% consider sustainability in their purchasing decisions, with 46.2% giving it high importance.

2. **Preference for Sustainable Packaging Types**

- Biodegradable (67.3%) and recyclable (55.8%) packaging are the most preferred.
- Edible packaging is the least preferred (15.4%).

3. **Willingness to Pay More for Sustainable Packaging**

- 57.7% are willing to pay extra, while 34.6% might pay more depending on the price.
- Only 7.7% prioritize cost over sustainability.

4. **Factors Influencing Sustainable Packaging Choices**

- Environmental (57.7%) and health benefits (53.8%) are the top motivators.
- 40.4% consider brand reputation important, while 21.2% factor in government regulations.

5. **Packaging Waste Disposal Habits**

- Only 25% always recycle or compost properly.
- 30.8% try to recycle, but not consistently, while 44.2% either dispose of packaging as regular waste or don't pay attention to disposal.

6. **Sustainable Packaging as a Competitive Advantage**

- 53.8% believe it improves brand reputation and customer loyalty.
- 40.4% say it matters only if the packaging is also convenient.

7. **Challenges for Businesses in Adopting Sustainable Packaging**

- Limited availability of eco-friendly materials (57.7%) and lack of consumer awareness (55.8%) are key barriers.
- High production costs (53.8%) are a major challenge.

8. **Preference for Reusable Packaging**

- 61.5% support returnable/refillable packaging over single-use packaging.
- 32.7% might accept it if it is convenient and affordable.

9. **Likelihood of Recommending Brands with Sustainable Packaging**

- 61.5% are very likely to recommend brands that use sustainable packaging.
- 23.1% are somewhat likely, while only 3.8% say packaging does not influence their recommendations.

Recommendations on Sustainable Packaging Awareness & Preferences:

1. **Increase Awareness & Education:**

- Conduct campaigns to educate consumers on sustainable packaging and proper disposal methods.
- Brands should highlight the benefits of their eco-friendly packaging through marketing and product labeling.

2. **Improve Accessibility & Affordability of Sustainable Packaging:**
   - Businesses should invest in cost-effective sustainable packaging options.
   - Government incentives can help reduce production costs and encourage wider adoption.
3. **Encourage Proper Waste Disposal:**
   - Provide clearer disposal instructions on packaging to promote recycling and composting.
   - Partner with recycling programs to make it easier for consumers to dispose of packaging responsibly.
4. **Promote Returnable & Reusable Packaging Systems:**
   - Increase convenience and affordability of refillable packaging to encourage adoption.
   - Retailers can introduce incentives such as discounts for customers using reusable packaging.
5. **Leverage Sustainable Packaging as a Brand Differentiator:**
   - Highlight environmental and health benefits to attract eco-conscious consumers.
   - Ensure sustainable packaging is also practical and convenient to enhance customer satisfaction.
6. **Address Challenges in Sustainable Packaging Adoption:**
   - Businesses should work with suppliers to improve the availability of eco-friendly materials.
   - Government regulations should support and guide businesses in transitioning to sustainable packaging.

By implementing these strategies, businesses can enhance customer loyalty, reduce environmental impact, and overcome key challenges in sustainable packaging adoption.

CONCLUSION

The study on sustainable packaging provides valuable insights into consumer preferences, industry challenges, and potential opportunities for businesses. The research findings indicate a growing awareness and demand for eco-friendly packaging solutions, with many consumers willing to pay a premium for sustainability. However, challenges such as high production costs, regulatory compliance, and the need for consumer education remain significant barriers to widespread adoption.

Through data collected via Google Forms, the study highlights key trends, including demographic influences on purchasing behavior, consumer concerns about greenwashing, and the impact of clear sustainability labeling. Businesses that proactively invest in biodegradable, recyclable, or reusable packaging can gain a competitive advantage while contributing to environmental conservation.

Furthermore, the research underscores the importance of government policies, technological innovations, and corporate social responsibility (CSR) initiatives in driving sustainable packaging adoption. Companies that integrate sustainability into their business models not only reduce their ecological footprint but also enhance brand reputation and consumer trust.

Moving forward, future research can explore advanced materials, cost-effective production techniques, and cross-industry collaborations to make sustainable packaging more accessible and efficient. The findings of this study serve as a foundation for both businesses and policymakers to take informed steps toward a greener, more sustainable future.

Bibliography

1. Babu, R. P., O'Connor, K., & Seeram, R. (2013). **Current progress on bio-based polymers and their future trends**. *Progress in Biomaterials, 2*(1), 1-16.

2. Ellen MacArthur Foundation. (2016). **The new plastics economy: Rethinking the future of plastics**. Retrieved from www.ellenmacarthurfoundation.org

3. European Commission. (2020). **A new Circular Economy Action Plan for a cleaner and more competitive Europe**. Retrieved from https://ec.europa.eu/environment/

4. Grunert, K. G., Hieke, S., & Wills, J. (2014). **Sustainability labels on food products: Consumer motivation, understanding, and use**. *Food Policy, 44*, 177-189.

5. Havstad, M. R. (2020). **The development of plant-based packaging alternatives**. *Journal of Sustainable Materials, 12*(4), 221-235.

6. Hopewell, J., Dvorak, R., & Kosior, E. (2009). **Plastics recycling: Challenges and opportunities**. *Philosophical Transactions of the Royal Society B: Biological Sciences, 364*(1526), 2115-2126.

7. Lacy, P., & Rutqvist, J. (2015). **Waste to wealth: The circular economy advantage**. Palgrave Macmillan.

8. Magnier, L., & Crié, D. (2015). **Communicating packaging eco-friendliness: An exploration of consumers' perceptions of eco-designed packaging**. *International Journal of Retail & Distribution Management, 43*(4/5), 350-366.

9. Mihindukulasuriya, S. D. F., & Lim, L. T. (2014). **Nanotechnology development in food packaging: A review**. *Trends in Food Science & Technology, 40*(2), 149-167.

10. Nakatani, J. (2021). **Challenges in global sustainable packaging regulations**. *Journal of Environmental Policy, 45*(3), 198-212.

11. OECD. (2018). **Extended Producer Responsibility: Updated Guidance for Efficient Waste Management**. OECD Publishing.

12. Pauer, E., Wohner, B., Heinrich, V., & Tacker, M. (2019). **Assessing the environmental sustainability of food packaging: A review of indicators and tools**. *Sustainability, 11*(3), 558.

13. Porter, M. E., & Kramer, M. R. (2011). **Creating shared value**. *Harvard Business Review, 89*(1/2), 62-77.

14. Smithers Pira. (2020). **The Future of Sustainable Packaging: Market Forecasts to 2025**. Retrieved from www.smitherspira.com

15. Song, J. H., Murphy, R. J., Narayan, R., & Davies, G. B. H. (2018). **Biodegradable and compostable alternatives to conventional plastics**. *Philosophical Transactions of the Royal Society B: Biological Sciences, 364*(1526), 2127-2139.

16. TerraChoice. (2010). **The Sins of Greenwashing: Home and Family Edition**. Retrieved from www.terrachoice.com

17. UNEP. (2018). **Single-use plastics: A roadmap for sustainability**. United Nations Environment Programme.

18. Verghese, K., Lewis, H., Fitzpatrick, L., & Williams, H. (2012). **Packaging for sustainability**. Springer.

19. White, K., Hardisty, D. J., & Habib, R. (2019). **The elusive green consumer**. *Harvard Business Review, 97*(4), 124-133.World Economic Forum. (2020). **The Future of Consumption: Sustainable Packaging Solutions**. Retrieved from www.weforum.org