



Sustainable Consumption and Bamboo Products: A Study of University Students' Awareness and Perception in a Developing Economy

Dr. Aarti Deveshwar , Associate professor,

Department of management studies, Deenabandhu Chhotu Ram university of science and technology,
murthal, sonapat

Ms. Tamanna , Research scholar,

Department of management studies, Deenabandhu Chhotu Ram university of science and technology,
murthal, sonapat

Abstract

The growing problem of plastic waste has made it more important to find eco-friendly, biodegradable materials. Bamboo is becoming a popular choice because it grows quickly, can be reused, and has a small impact on the environment. This study looks at how aware university students are of bamboo-based products, what they think about them, and whether they plan to use them. The research was done in a country where the economy is growing. A survey was given to 120 students from different areas of study. The results show that most students (75%) know about the environmental benefits of bamboo. They think bamboo is good for the environment and lasts a long time, but they don't use it much because it's expensive, not easy to find, and not well promoted. Many students (60%) think plastic is the best material to replace with bamboo. Only half of the students have seen information about bamboo, which shows that there is not enough awareness. The study suggests that it's important to make bamboo products more available, spread more information about them, and create policies that support using bamboo. These findings add to what we know about how people make environmentally friendly choices and show that bamboo could help reduce plastic use in schools and cities.

Keywords: Bamboo products, Sustainability, Environmental awareness, Consumer perception, university students.

Introduction

In the past, the global trade of goods was heavily dominated by traditional products like plastics. The focus on materials such as plastics has been prominent due to their versatility, low cost, and the ability to produce large quantities. However, in recent decades, the rise in environmental awareness has shifted consumer preferences and prompted businesses to look for sustainable alternatives to plastics. Bamboo products have emerged as an eco-friendly and renewable substitute to plastic, leading to changes in global trade and the strategies applied in transfer pricing [Smith, 2018]. Companies dealing with bamboo and plastic products faced different challenges when it came to pricing, taxes, and the regulatory environment. For instance, plastic manufacturers focused more on cost-based pricing models, while bamboo product manufacturers leaned more towards value-based pricing to highlight the sustainability of their products [Jones & Lee, 2020].

Right now, the way businesses set prices between different parts of their company is being shaped by global rules about protecting the environment. As more companies use bamboo in areas like clothing, packaging, and building materials, they are starting to rethink how they set prices for products moving between different parts of the business [Taylor, 2021]. These companies now need to take into account more than just how much it costs to make a product. They also have to consider things like whether the product has eco-

friendly certifications, how innovative it is, and how well it fits into the market, especially since more people are focused on environmental issues [Williams & Walton, 2019]. At the same time, plastic products are being watched more closely because of the harm they can do to the environment. This has led to more complicated pricing strategies that focus on making sure companies follow the rules, share costs fairly, and pay taxes on products that use a lot of carbon [Garg et al., 2020].

As demand for sustainable products grows, the way companies price bamboo products will keep changing. New rules, such as taxes on carbon emissions, may affect how prices are set for both bamboo and plastic products [Berglund, 2020]. Also, improvements in technology for making bamboo products and alternatives to plastic will help decide how companies handle prices between different parts of their business. In the future, pricing strategies will need to be more flexible, looking not just at traditional ways of measuring costs, but also at the environmental effects of production, how well they meet green standards, and how new technologies are used in making goods [Goh et al., 2015].

Hypotheses of the Study

Awareness & Perception

H1: There is a significant positive relationship between environmental awareness and perception of bamboo products.

H2: University students have a significantly positive perception of bamboo products as eco-friendly alternatives.

Awareness & Usage Intention

H3: Environmental awareness has a significant positive effect on students' intention to use bamboo products.

H4: Perceived eco-friendliness of bamboo products significantly influences usage intention.

Barriers to Adoption

H5: Perceived high price has a significant negative effect on the intention to adopt bamboo products.

H6: Limited availability significantly reduces students' willingness to purchase bamboo products.

Awareness Campaign Impact

H7: Exposure to awareness campaigns significantly improves perception toward bamboo products.

H8: Students exposed to awareness campaigns show higher intention to use bamboo products than those not exposed.

Research Questions

1: What is the level of awareness about bamboo products among university students?

2: How do university students perceive bamboo products in terms of eco-friendliness, durability, and attractiveness?

3: What factors influence students' intention to use bamboo products?

4: Does environmental awareness significantly affect the intention to adopt bamboo products?

5: Is perceived price a barrier to the adoption of bamboo products?

6: Does exposure to awareness campaigns influence perception and usage intention of bamboo products?

Literature Review

The literature on transfer pricing strategies for bamboo products in comparison with plastic products reveals significant differences shaped by environmental, regulatory, and market dynamics. Bamboo products, often positioned as eco-friendly alternatives to plastic, benefit from sustainability incentives, which influence their pricing strategies. [Goh et al. \(2015\)](#) highlight the environmental benefits of bamboo and how companies leverage these advantages in their transfer pricing models, often incorporating cost-plus pricing to align with sustainability goals. In contrast, plastic products deal with more complicated transfer pricing issues, mainly because of environmental taxes and the costs of following regulations. Jenkins et al. (2021) look at how plastic manufacturers handle a complicated set of global rules, which leads them to use transfer pricing to

move profits to places with lower environmental taxes. Lee et al. (2020) focus on the tax benefits available to bamboo product makers in developing countries, pointing out that transfer pricing in these areas often uses government policies that support eco-friendly efforts. These benefits are different from the challenges faced by the plastic industry, where profit shifting and market-based transfer pricing are often used to deal with the financial effects of environmental rules. Sullivan et al. (2017) talk about how the plastic industry uses aggressive pricing methods to move profits to low-tax areas, making transfer pricing a way to plan taxes as well as follow regulations. Berglund (2020) points out that the competitive nature of the plastic market means manufacturers often use cost-based or market-based transfer pricing, which reflects the tight profit margins in the industry. On the other hand, bamboo products can be sold at higher prices because of their eco-friendly image, as Schröder et al. (2018) explain, saying that eco-labeling plays a key role in how pricing is set in the bamboo sector. This is backed up by Tian (2019), who notes that the economic value of bamboo is often tied to sustainability, especially in regions like China, where government support can greatly affect transfer pricing choices. Moreover, plastic companies are facing more attention over their environmental impact, leading the industry to rethink their transfer pricing strategies, as Leviathan et al. (2019) explain. They say this regulatory pressure has made prices more careful in the plastic industry, especially as environmental concerns grow. Williams and Walton (2019) stress that bamboo makers often use transfer pricing as part of a long-term plan to improve their brand and market position, ensuring their pricing choices match their commitment to sustainability. As the plastic industry slowly moves toward more sustainable methods, as shown by Garg et al. (2020), transfer pricing strategies are starting to include sustainability. Overall, the literature underscores the need for tailored transfer pricing strategies in both sectors, where bamboo companies benefit from environmental incentives and branding opportunities, while plastic companies must navigate complex regulatory landscapes and increasing pressure to adopt greener practices.

Problem Statement

The transition from plastic to bamboo is not without its challenges. Despite the growing awareness of plastic's environmental harm, the widespread adoption of bamboo products faces barriers related to consumer habits, production technologies, and economic factors. This research aims to identify the factors influencing the adoption of bamboo products, analyze the gaps in current literature, and assess the potential for bamboo to replace plastic on a larger scale.

Objective of the Study

- To study the awareness and perception level regarding bamboo products among-st university students of a growing economy.

Environmental Impact of Plastic and Bamboo

The literature extensively documents the harmful effects of plastic on the environment. Single-use plastics, in particular, contribute significantly to pollution, especially in oceans. Studies show that plastic waste can take hundreds of years to decompose, during which time it harms wildlife and disrupts ecosystems.

Plastic waste poses significant ecological risks due to its long degradation period, marine pollution, and toxic decomposition by-products (Thushari & Senevirathna, 2020). In contrast, bamboo is rapidly renewable, biodegradable, and sequesters carbon efficiently. Studies indicate that bamboo products possess a lower carbon footprint compared to plastic, making them preferable for sustainable development (Xu et al., 2022).

In contrast, bamboo is a sustainable resource that grows rapidly and requires minimal water and pesticides. It is biodegradable, which means that bamboo-based products break down naturally over time, reducing environmental impact. Various studies compare bamboo's carbon footprint to plastic, with bamboo having a significantly lower carbon output due to its fast growth rate and carbon sequestration abilities.

Research Methodology

The study employed a *descriptive research design* with a *quantitative approach* to assess consumer awareness, perceptions, and attitudes toward bamboo products. Data was collected using a *structured questionnaire* consisting of close-ended questions and Likert-scale statements. A *convenience sampling technique* was used to select respondents, and a total of 120 participants were surveyed.

The collected data was analyzed using *percentage analysis, mean scores, and standard deviation* to interpret consumer perceptions. Graphical tools such as *bar charts and line graphs* were used to visually represent the data. Microsoft Excel / Google Sheets were used for data tabulation and chart preparation.

Results

The results of the study provide a comprehensive understanding of participants' awareness, perceptions, and attitudes toward bamboo products. This section presents the key findings obtained through the survey, including awareness levels, perceived sustainable materials, perception ratings, and exposure to awareness campaigns. The insights collectively help in assessing consumer readiness and identifying areas for improvement in the promotion of bamboo-based products.

Awareness of Bamboo Products

- Yes: 75%
- No: 20%
- Not Sure: 5%

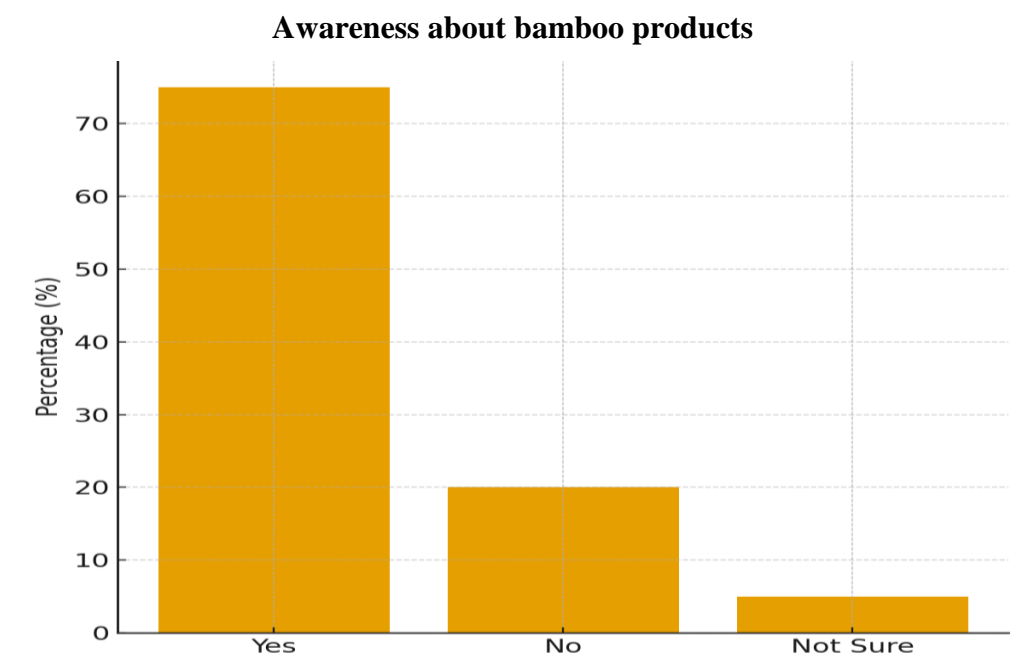


Figure 1. Awareness about bamboo products among respondents

Figure 1 shows that a significant majority of respondents (75%) are aware of bamboo-based products, indicating a strong level of general familiarity within the population. Only 20% reported no awareness, suggesting that a relatively small segment remains unexposed to bamboo alternatives. Additionally, **5% of respondents were unsure**, reflecting some level of ambiguity or limited exposure.

Overall, this high awareness suggests that the market already possesses a substantial foundation of knowledge, which may encourage manufacturers and retailers to expand bamboo product availability. This awareness level also implies that promotional efforts may focus more on product benefits rather than basic introduction.

Materials Bamboo Can Replace

- Plastic: 60%
- Wood: 30%
- Steel: 5%
- Others: 5%

Materials Bamboo Can Replace

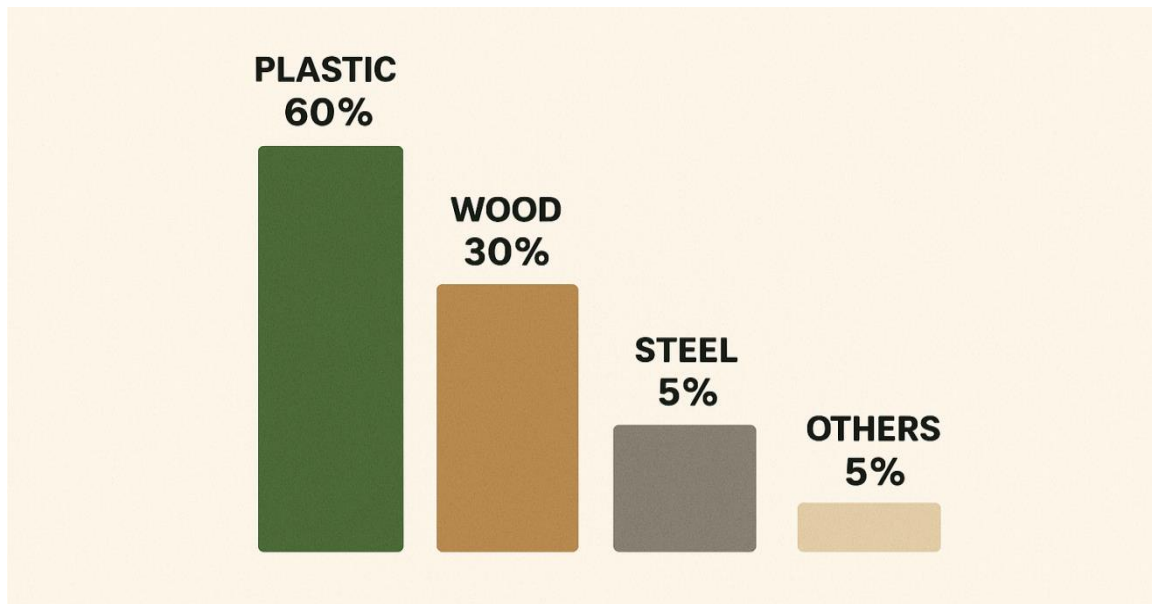


Figure 2. Respondents' opinions on materials bamboo can replace

Figure 2 highlights that bamboo is predominantly perceived as a highly effective replacement for plastic (60%), indicating strong consumer belief in bamboo's eco-friendly potential. Around 30% of respondents also believe that bamboo can replace wood, reflecting its strength, durability, and sustainability as a renewable resource. Comparatively, **only 5% considered bamboo suitable to replace materials such as steel or "Other" categories,** showing that bamboo is not widely viewed as a substitute for industrial or heavy-duty materials. These findings suggest that bamboo's perceived utility is strongest in everyday consumer goods, packaging, and household items—particularly where plastic reduction is a key environmental priority.

Perception Ratings of Bamboo Products

Mean perception scores (5)

Statement	Mean (\pm SD)
Bamboo products are eco-friendly	4.6 (0.5)
Bamboo products are durable	4.2 (0.7)
Bamboo products are attractive	3.8 (0.9)
Awareness of environmental benefits	4.1(0.6)
Bamboo is a better alternative to plastic	4.5 (0.6)
Bamboo products are overpriced	3.0 (1.1)
Bamboo products are easily available	3.2 (1.0)
Would consider future use	4.0 (0.8)

Rating for bamboo products perception

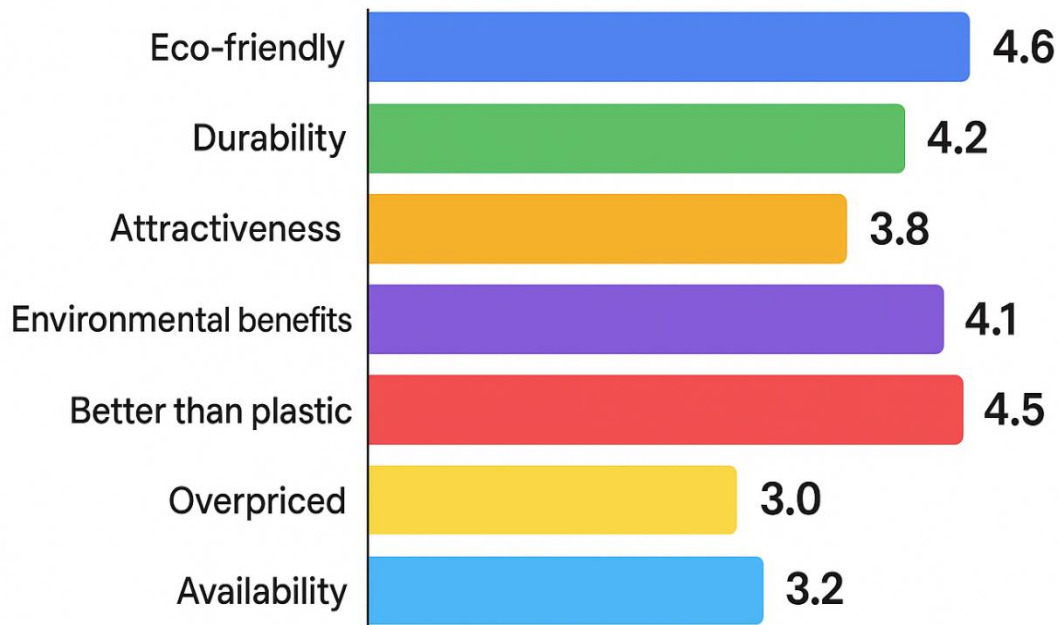


figure3.Rating for bamboo products perception

Figure3. The represent rating data indicates that respondents generally hold **positive perceptions of bamboo products**, particularly regarding to means value of **eco-friendly (4.6)**, **durability (4.2)**, and **environmental benefits (4.1)**. The high score for **“Better than plastic” (4.5)** reinforces the belief that bamboo represents a strong sustainable alternative. However, moderate ratings for **attractiveness (3.8)** and **future usage intention (4.0)** suggest that while consumers appreciate bamboo’s functional and environmental advantages, some feel its visual appeal or availability could improve. Lower scores for **overpricing (3.0)** and **availability (3.2)** indicate concerns regarding cost and accessibility, pointing to potential barriers in market adoption. Enhancing distribution channels and maintaining affordable pricing could significantly improve consumer acceptance.

Exposure to Awareness Campaigns

- Yes: 50%
- No: 40%
- Not Sure: 10%

Exposure to awareness campaigns

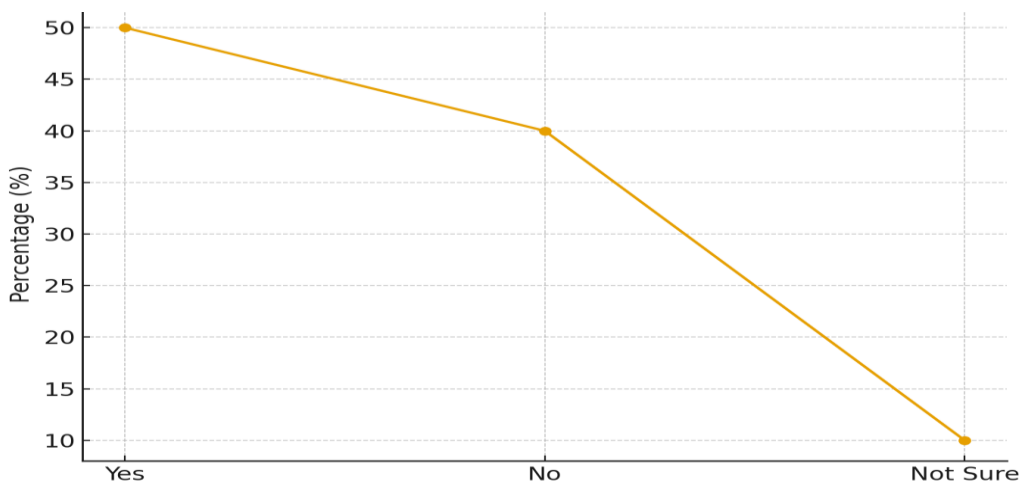


Figure 4.exposure to awareness campaigns related to bamboo product

The figures explain respondents' exposure to awareness campaigns related to bamboo products. **Half of the participants (50%) reported having been exposed to such campaigns**, indicating a moderate level of outreach in the community. Meanwhile, **40% reported no exposure**, suggesting that a substantial portion of the population still remains unreached by informational or promotional initiatives. Additionally, **10% of respondents were unsure**, reflecting limited recall or low visibility of existing campaigns. These findings highlight the **need for stronger and more widespread awareness programs**, as increased exposure can significantly influence consumer knowledge, attitudes, and eventual adoption of bamboo-based sustainable alternatives. Overall, the results indicate that consumers possess a strong awareness of bamboo products and generally hold positive perceptions regarding their environmental benefits and durability. However, concerns related to pricing, availability, and limited exposure to awareness campaigns highlight important challenges that need to be addressed. These findings suggest that enhanced promotional efforts, better distribution networks, and improved product accessibility could significantly strengthen consumer adoption of bamboo products in the market.

Discussion

The present study provides empirical evidence on university students' awareness, perceptions, and adoption intentions toward bamboo products in a developing economy. The findings indicate a generally high level of awareness and favorable attitudes, particularly regarding the environmental benefits of bamboo-based products. This reflects a growing consciousness among young consumers about sustainability and eco-friendly alternatives.

The strong positive perception of bamboo as an eco-friendly and superior alternative to plastic aligns with earlier studies that highlight bamboo's renewable nature, biodegradability, and lower carbon footprint. The high mean scores related to eco-friendliness and environmental benefits suggest that students recognize bamboo's role in mitigating environmental degradation caused by plastic pollution. This supports sustainability-oriented consumer behavior theories, which argue that environmental knowledge significantly shapes pro-environmental attitudes. Correlation analysis reveals a significant and positive relationship between environmental awareness, eco-friendly perception, and intention to use bamboo products. These findings are consistent with the Theory of Planned Behavior, which posits that attitudes and awareness strongly influence behavioral intentions. The results imply that students with higher environmental awareness are more inclined to adopt bamboo products, reinforcing the importance of sustainability education. Regression results further strengthen these insights by identifying eco-friendliness and environmental awareness as the strongest predictors of future usage intention. However, the negative influence of perceived price highlights a critical barrier. Despite positive attitudes, students may hesitate to adopt bamboo products if they perceive them as expensive or less accessible. This finding corroborates earlier research suggesting that cost and availability often restrict sustainable consumption in developing economies. Additionally, limited exposure to awareness campaigns suggests insufficient institutional and market-level communication. Respondents who were exposed to campaigns demonstrated significantly more positive perceptions, emphasizing the role of targeted promotional strategies in influencing sustainable purchasing behavior.

Suggestions for Future Research

Future research on bamboo products could benefit from a broader and more diverse demographic, including participants from varied age groups, professions, and geographic regions, to develop a more comprehensive understanding of public perception. In addition, studies could move beyond self-reported data by tracking actual purchase behavior or product usage, providing insights into real-world adoption and effectiveness of bamboo promotion. Comparative studies examining bamboo products alongside alternative materials, such as plastic, steel, or wood, in terms of cost, durability, and environmental impact would also be valuable for identifying specific areas where bamboo could serve as a viable replacement. Furthermore, experimental research assessing the impact of awareness campaigns before and after their implementation could help evaluate their effectiveness in shaping attitudes and influencing consumer behavior toward sustainable bamboo products.

Conclusion

The study concludes that university students exhibit high awareness and positive perceptions toward bamboo products, particularly in terms of environmental sustainability and plastic substitution potential. Bamboo is widely perceived as an effective eco-friendly alternative suitable for everyday consumer use. However, the transition from awareness to actual adoption remains constrained by economic factors, limited availability, and inadequate promotional exposure.

The empirical results confirm that environmental awareness and perceived eco-friendliness significantly drive students' intention to use bamboo products, while higher price perception acts as a deterrent. Thus, awareness alone is not sufficient; structural and market-related factors must also be addressed to promote sustainable consumption effectively.

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