INDIAN CONSUMERS' PERSPECTIVE TO PLASTIC AND PLASTIC ALTERNATIVES

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Dedication

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Acknowledgements

I would like to deeply express my gratitude towards my mentors, peers, and respondents, whose supervision, encouragement, and engagement were instrumental in ensuring the positive outcome of my research about consumer behaviour towards plastic alternatives.

ABSTRACT

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<year>

Dissertation Chair: <Chair's Name>
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This research investigates the view of Indian consumers towards plastics and possible alternatives, including the analysis of awareness, attitudes and behaviours to inform workable sustainable material policies and implement sustainable material policies. Other plastic alternatives employed in India are briefly described in the literature review chapter, such as reusable glass and metal containers, compostable and biodegradable bags, products of the areca leaf and bagasse packaging. The assessment of the life of different types of plastics, including paper, glass, aluminium, and bioplastics, is also reflected in this chapter. How consumers view the positives and negatives of using plastic alternatives, the influence of corporate and governmental bodies on consumer behaviour in India and the hindrance to the implementation of plastic alternatives in the country were also evident in this chapter. This section also gives a conceptual framework, a literature gap, and theories. The methodology chapter clearly focuses on the "exploratory design", a "pragmatic philosophy", and "inductive reasoning" in order to conduct authentic research based on

Indian consumers' perspective on plastics and sustainable alternatives. This chapter concisely describes that this research is based on both primary qualitative through descriptive statistics and secondary qualitative through thematic analysis, where themes were derived from a systematic literature review. This study investigated the perceptions of Indian consumers to plastics and its substitutes with respect to awareness, attitudes and behavioural adoption. Survey results indicate that although 95 percent of the respondents acknowledge the danger of plastic pollution, the cost, availability, and convenience of alternative materials, including paper, glass, aluminium, and biodegradable plastic, are the factors holding back a mass shift to the latter. Thus, behaviour gap that presents the paradox in that, although many consumers accept that plastic is bad on the environment, they still use it due to cost, and convenience reasons. The main takeaways include enhancing waste management facilities, carrying out specific awareness activities, offering incentive and subsidies to reduce the cost, and making the practice compliant with the cultural norms and the cultural-related innovations.

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CHAPTER I: INTRODUCTION

1.1 Introduction

Plastic has become a huge part of the modern world, but its vast consumption has posed serious environmental problems, especially in India, where waste systems are being overwhelmed. The rising pollution issue has also triggered interest in alternatives to paper, glass, aluminium, and bioplastics. Nonetheless, it is not quite clear whether they are beneficial to the environment. This research examines attitudes towards plastics and their alternatives among Indian consumers, including measurement of awareness, attitudes and behaviours as well as environmental impacts. The results enlighten policies and sustainable strategies of material use that balance environmental, economic, and social aspects in India towards lessened plastic reliance.

1.2 Background

Plastic is now one of the most extensive and important materials of modern times that has revolutionised the industries, consumer patterns, and everyday reality. Its affordability, weighing less, flexibility, and stability have secured a place in packaging, manufacturing, and various other things, which are innumerable. The fast expansion and growth of the economy, urbanisation and consumer demand have spurred the sharp escalation of plastic production and consumption in India.

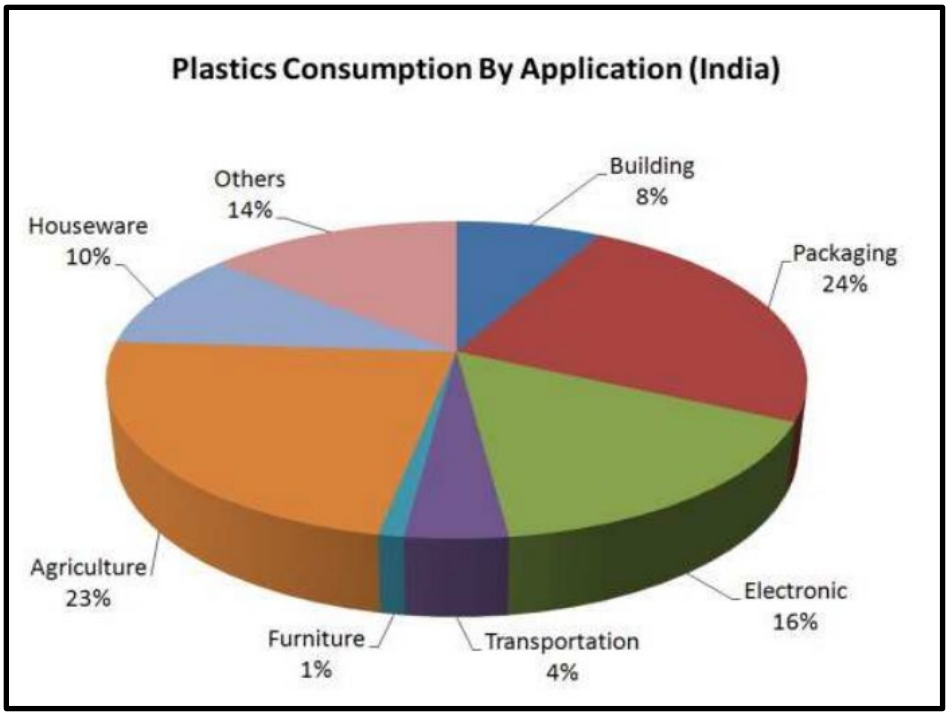

Figure 1.1: Plastic Consumption in India

(Source: Unido.org, 2025)

In India, plastic consumption is highest in packaging (24%) and agriculture (23%), together making up nearly half of the total usage, followed by electronics (16%) and housewares (10%) (Unido.org, 2025). India's plastic waste output has surged in the past five years, more than doubling with an average yearly growth rate of 21.8% (Ndtv.com, 2025). Much of it is employed in packaging, which has a short life cycle and gets disposed of easily, adding to the increasing waste menace. Plastic use has become a critical issue regarding its impact on the environment. Plastic is not biodegradable, but rather it breaks into minuscule pieces, microplastics, that accumulate in the soil, water, and food chain (Malafeev *et al.,* 2023). Vast quantities of plastic waste that are not properly managed find their way to rivers and oceans, polluting marine life, decreasing biodiversity, and may threaten human health. Only 60% of plastic is recycled, leaving 9,400 tonnes to pollute land, air, and water, with 70% of packaging quickly turning into waste (Sbmurban.org, 2025). This environmental load is compounded by the poor collection and recycling infrastructure for

the waste. Approximately one-sixth of the total plastic waste originates from 60 major cities, with Delhi, Chennai, Kolkata, Mumbai, and Bengaluru collectively accounting for over half of this urban contribution (Timesofindia.indiatimes.com, 2025).

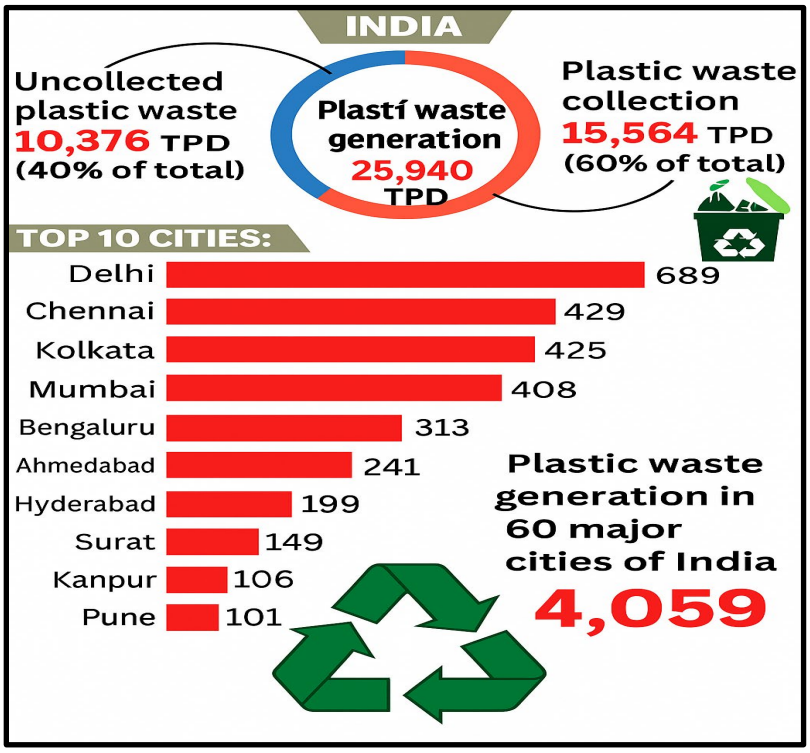

Figure 1.2: Plastic Waste in India

(Source: Timesofindia.indiatimes.com, 2025)

In order to reduce such effects, different alternatives to plastic have been encouraged by governments, industries and researchers. These consist of paper, glass, aluminium and bioplastics. The alternatives all have their own sets of advantages and disadvantages with their own environmental impacts depending on the methods of production, consumption and disposal. An example is paper, which is biodegradable and can be composted, but a lot of water, energy, and raw materials are utilised to manufacture the product (Ahsan *et al.,* 2023). Glass can be endlessly recycled and does not lose any of its quality; however, it is very energy-demanding to create. Aluminium can be easily recycled, is vulnerable to being lightweight and damaging to the ecosystems due to the huge energy consumption in mining

and processing of the element (Georgitzikis *et al.,* 2021). Bioplastics, which are derived using renewable resources, are sold as eco-friendly products despite many of them needing industrial composting plant facilities and some of them emitting greenhouse gases when they decompose.

Life cycle assessment (LCA) is fundamental in the process of assessing such materials. LCA takes into account the total environmental impact of a given product, including the extraction of the associated raw materials, production, use and the disposal stage as well (Molina-Besch, 2022). Some alternatives work better than traditional plastics in certain arenas, whereas some have greater cumulative impacts, particularly where recycling systems are compromised or absent. It implies that by plastic with any other material will not necessarily provide any environmental advantages, and possibly in other contexts, simply transfer the problem to another unacceptable state.

There are several factors affecting the use of plastic alternatives in India. Businesses and consumers have been willing to seek alternatives because of government regulations like the one that prohibits the use of some disposable plastic products in the country (Wong, 2023). But it is currently hard to implement widely. The factors of cost, convenience and availability are critical to consumers. Plastic is the most convenient and cost-effective mode of production for many consumers and small enterprises with low income. Conversely, urban and wealthier customers might be willing to accept substitutes but would continue to use plastics due to practicality or convention. Consumer perceptions are important aspects of the design of interventions (Gonzalez-Arco *et al.,* 2021). The reality of the environmental costs of plastics and substitutes may not be familiar to consumers. There is a belief that some may question the durability or the safety of some alternative materials, and there are those who may focus more on price but not on the environment. Behaviour can be changed through education, good labelling, and messaging, but there is a wider systemic impact on changes in consumption through the availability of infrastructure in segregating waste, collecting waste, and recycling waste.

There is an economic and social aspect to the matter. The shift to the alternatives might bring new possibilities for industries and jobs, especially in sustainable packaging and recycling (Nasrollahi *et al.,* 2022). Nevertheless, it could also cause havoc to the current supply chain in the plastic industry, which affects livelihoods. The other factor-social equity, sustainable options should be affordable and accessible to every member of society and not just the higher-income members. Even though there is more focus on the alternatives, there seems to be no certainty as to their real environmental performance in the Indian scenario. They are highly advantageous or disadvantaged with regard to the production methods, energy sources, transportation logistics and waste management capacities. In the absence of a clear comprehension of these factors, one risks exchanging one group of environmental issues for another. There must thus be a balanced approach that would minimise the use of plastics, encourage the use of alternatives that are truly sustainable and enhance waste management systems.

The present study seeks to fill this gap by studying the views of Indian consumers towards plastic and plastic alternatives and an evaluation of the environmental impacts that plastic and plastic alternatives have. This two-step approach captures consumer usage and assesses the applicability and sustainability of alternatives. Findings of these studies may inform policy formulation, corporate and governmental environmental policy and planning and environmental activists to create an environment that meets economic practicality and consumer willingness.

1.3 Research problem

Plastics have now taken root in modern India and affect lives, industry, and consumer behaviour in India to an extent that they have become an essential part of daily comfort. They are inexpensive, flexible, lightweight, durable, and hence, they are preferred materials in the packaging, production, farming, and many other uses. Nevertheless, the convenience has a huge price in the form of environmental cost. The consumption of plastic in India has nearly increased five times in the past years because of urbanisation, growth of the economy, and the rise of consumerism (Padgelwar *et al.*, 2021). A large percentage of this plastic, especially that which is packaging disposal is discarded at a high rate and

also with a short lifespan, thus they contribute to the increased waste menace. Along with plastic usage, there are significant adverse impacts of plastic usage on the environment. Plastics are not biodegradable, and hence they can pollute water, soil, and even the food chain since they do not break down easily, forming microplastics. This, besides posing a threat to the marine environments and species, also causes harm to human health. As it is stated at Bisleri.com (2025), only 60% of the plastic garbage in India is recycled, which means that thousands of tons of waste contribute to the pollution of rivers, seas, and lands in India. Weak infrastructure in recycling and garbage collection, especially in large cities where the greatest amount of plastic waste is generated, is another aggravating factor.

Consequently, governments, companies, and scientists have been marketing alternatives to plastic, such as paper, glass, aluminium, and bioplastics. In spite of each of these materials often being marketed as a greener alternative, the reality is more complicated. As an example, despite the fact that paper is a biodegradable material, significant amounts of power, water, and natural resources go into its manufacture. Recycling glass can take place forever. However, the production of glass uses a lot of energy. Even though aluminium can be recycled repeatedly, collecting and recycling aluminium may destroy the ecosystem with the use of energy (Kumai, 2023). Although bioplastics are advertised as more environmentally friendly, they may still require the use of specialist industrial composting plants and generate greenhouse gases during the decomposition process. A crucial method of establishing the true environmental performance of the materials is LCA or Life Cycle Assessment, which measures the environmental impacts of various stages of inputs of raw materials through manufacture to use and disposal. Some studies show that the replacement of plastic with another material will not always show positive results for the environment. It may sometimes shift emphasis between environmental concerns, especially where there is recycling infrastructure and/or it is poorly developed.

The adaptation of plastic substitutes in India is influenced by a number of factors, such as government laws, cost, availability, convenience, and consumer knowledge (Nøklebye *et al.*, 2023). Urban customers with higher incomes may be easier to convince to switch

alternatives, although they may cling to plastics because it is either convenient or a habit. Plastic remains the most affordable and readily available choice among the low-income citizens. Moreover, the misconceptions about cost, durability, and safety persist, and most customers are unaware of the environmental trade-off involved with some materials. There is a socioeconomic compounding of the problem. Switching to alternatives can upset the existing supply chains in the plastics industry, and thus affect lives, but potentially new possibilities emerge for businesses and green jobs (Aristi Capetillo *et al.*, 2023). Thus, every aspect of society should have the ability to afford and obtain sustainable solutions. Due to these nuances, the study vacuum in the knowledge of how consumer attitudes and behavior will influence the adoption of alternatives to plastics in India, and how it will impact the environment, is glaring. In the absence of this knowledge, there is a risk that policies are introduced or goods are marketed that do not enhance sustainability but the opposite. This study attempts to bridge this gap by researching the views of the Indian consumer towards plastic and its alternatives, through life cycle analysis, and ascertaining whether or not they are viable options in reducing pollution in India. The policymakers, corporations, and environmental campaigners seeking to reach a balance between what consumers will accept, pragmatism, and what is really environmentally sustainable will find immense value in the results.

1.4 Research Scope

This paper focuses on analysing the Indian consumer perception towards plastics and alternatives to them, namely paper, glass, aluminium and bioplastics in the larger context of environmental sustainability. The Indian market is considered only as the research region due to its sociological and economic diversification, rapid urbanisation and the changing regulations in terms of plastic usage (Mandpe *et al.,* 2023). There are two dimensions to the scope of this research. The first one is an attempt to identify and classify the available and used plastic alternatives to their various and current categories with increased focus on the affordability, availability, and inclusion. This also focuses on the population across the different income levels and population demographics, as well as patterns. Second, it compares these options using a Life Cycle Assessment or LCA. This

helps to measure the true environmental impact of these options in the life cycle of the raw materials used, the manufacturing, and the use and ultimate disposal or recycling of them (Marrucci *et al.,* 2025). Moreover, this research revolves around consumer attitudes and behaviours. Factors to be analysed in the study include awareness levels, the perceived benefits and concerns regarding alternatives to plastic, and socio-economic and cultural aspects of adoption decisions. Comparison of urban and rural segments of consumers would be done to reveal the discrepancies in access and convenience and intentions to switch (Wijekoon and Sabri, 2021). Furthermore, consumer behaviour is also discussed concerning the ways government policies, industry activities and campaigns can influence consumer behaviour.

Consequently, even though the study is cognisant of the technical and environmental difficulty of substituting for the use of plastics, it would not involve experimental tests on the material. Rather, it would make use of secondary information in environmental impact data. However, the surveys and interview data collected as primary data would be used to obtain the perceptions and behavioural patterns. Furthermore, the scope of environmental assessment would be located within the Indian setting, where the infrastructure of waste management, recycling capacities and the conditions of the supply chain can vary considerably as compared to the developed economies (Fiksel *et al.,* 2021). This backdrop is vitally important to determine the usefulness of global green solutions in India. It is not the intention of the study to cover all industrial uses of plastics. Rather, it would be based on packaging, household products, and single-use or high-consumption and high-disposal products. Aside from these, the research would draw on consumer opinions and sustainability evaluations to give policymakers, enterprises and environmental activists some insight to realise practical policies (Kumar *et al.,* 2021). These can blend environmental sustainability with economic affordability and social access within the context of reducing plastic reliance in India.

1.5 Research purpose

The purpose of this research is to look into the perceptions, awareness and behaviours of the Indian consumers regarding plastics and their alternatives, namely paper, glass,

aluminium and bioplastics relevant to environmental sustainability. Similarly, plastics have a huge presence in the Indian economy and social life because they provide affordability, multi-functionality and convenience (Nøklebye *et al.,* 2023). However, their environmental effects are drastic and affect the environment, such as causing pollution, destroying biodiversity and harming human health. Accordingly, even though there are a number of substitutes being sold as more eco-friendly alternatives, their actual sustainability is questionable, especially in India, where waste separation, recycling, and composting facilities are usually not up to the mark (Thapliyal *et al.,* 2024). Hence, this research focuses on filling this knowledge gap by combining the analysis of the consumer perception with an LCA analysis of plastic alternatives, allowing an overall comprehension of the behavioural and environmental aspects (Corona *et al.,* 2024). Moreover, this research would be used to determine the levels of knowledge of consumers on the benefits or drawbacks of different options, their readiness to take them and the socio-economic and cultural aspects that determine the uptake. It would also draw comparisons on the environmental effects of the alternatives at their stages of production, usage and disposal.

Furthermore, this research would consequently expose the existing disparities in terms of accessibility, affordability and acceptability of sustainable materials through the consideration of both urban and rural consumer groups (Nøklebye *et al.,* 2023). The results would provide useful policy ideas to policymakers, industry stakeholders and environmental activists on the ways to develop interventions, policies and awareness programmes to strike the right balance between the sustainability of the environment, economic, and social viability. This is ultimately aimed at driving India towards the reduction in dependency on plastics using strategies that are viable, inclusive and sustainable.

1.6 Research relevance

The importance of this research is that it presents one of the current environmental issues that India is facing, which is plastic pollution. Similarly, it evaluated consumer insights and the actual sustainability of finding alternatives to plastic. Accordingly, even though government rules and company policies are fostering alternatives like paper, glass,

aluminium and bioplastics, little is known about their actual environmental contribution within the Indian environment (Barrowclough and Birkbeck, 2022). The combination of consumer behaviour analysis and LCA allows looking at the issue in two ways simultaneously. These are both getting an idea of the nature of the public awareness, preferences, and barriers towards adopting these materials and assessing the real environmental consequences of such materials. This is essential since, in the absence of the proper understanding, policies and marketing campaigns can end up promoting alternatives that would only change the situation as opposed to the resolution of environmental problems (Pathak, 2023). The results would be useful to the policy-makers, companies and the environmental activists who are willing to come up with strategies that can support the three components of environment-friendly, economically-affordable and people-friendly. Furthermore, the study is useful to the people of India who seek to make intelligent decisions towards limiting the dependency on plastics in the country without compromising on convenience, fairness and sustainability.

1.7 Research Aim and Objectives

Aim:

This study aims to comprehend how Indian consumers perceive and use plastic and its alternatives by examining various sustainable alternatives they have in the market.

Objectives:

- To understand the different types of plastic alternatives being used in India and to evaluate their environmental impacts and their lifecycle assessment.
- To determine whether plastic alternatives are a viable option for reducing environmental pollution in India.
- To identify the Indian consumers' patterns of choosing or not choosing plastic and plastic alternatives.

1.8 Research Questions

1. What are the different types of plastic alternatives being used in India?

2. How is lifecycle assessment conducted for different types of plastic, including paper, glass, aluminum, and bioplastics?

3. What are the knowledge levels of consumers about the benefits and drawbacks of using these materials?

4. What is the overall impact of plastic alternatives on the environment?

5. Are plastic alternatives a viable option for reducing environmental pollution in India?

1.9 Structure Overview

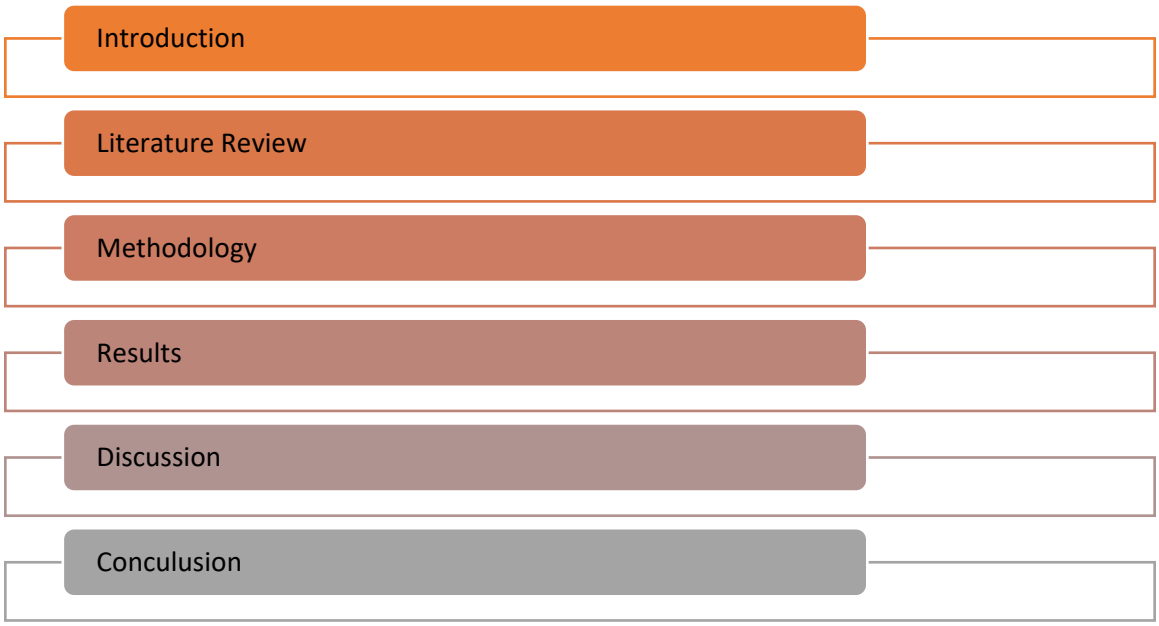

Figure 1.3: Structure Overview

The present research contains a total of six chapters. Chapter one, or the introductory chapter, enables to focus on Indian consumers' views about plastics and their alternatives by giving an overview of the background, issues, objectives, and purpose that describe the research. Chapter Two: Literature Review emphasizes the key areas of research as it looks into the body of literature that is already present around the use of plastics, alternatives, the

implications they have on the environment, and cycle-based assessments. Full methodology will be discussed in Chapter 3 together with the research plan, data gathering methods and analysis procedures, and design of the consumer survey and systematic literature review. Chapter 4 presents the results of the survey and literature research, as well as an overview of consumer trends, attitudes, and behaviours. Chapter 5 relates these findings to previous studies and discusses their sustainable and policy implications, as well as makes suggestions about how these findings can inform policy. Chapter 6, or the conclusion, ends with a review of the most essential findings, helpful tips, and suggestions about the future study paths.

1.10 Summary

This chapter presented the study of the attitude concerning plastic and alternatives of paper, glass, aluminium and bioplastics as consumed by the Indian consumers, focusing on the perspective of environmental sustainability. It set out the background, research problem, scope, purpose and relevance and pointed to the increasing consumption of plastic in India and the related environmental issues, as well as the difficulty of assessing alternatives. The aim, objectives and research questions became evident, as well as the structure of the study. Moreover, this chapter provided the basis on which consumer awareness, attitudes and behaviours would be assessed and incorporates Life Cycle Assessment to determine the real sustainability.

CHAPTER II:
REVIEW OF LITERATURE

2.1 Introduction

The literature review chapter condenses upon a variety of non-plastic substitutes currently employed in India, such as compostable and biodegradable bags, reusable steel and glass boxes, areca fruit products and bagasse packaging. This chapter also explains the analysis of the lifecycle of other plastics, including paper, glass, aluminium, and bioplastics. Moreover, this chapter demonstrates how customers perceive the list of merits and demerits involved in using plastic alternatives, general environmental impact of plastic alternatives, and sustainability of India in terms of using plastic alternatives, and reduction of environmental pollution in the country, how corporate and governmental organisations affect the pattern of consumer behaviour in India, and what barriers exist to the adoption of plastic alternatives in the country. Here, a conceptual framework, a literature gap and theoretical perspectives are also outlined.

2.2 Different Kinds of plastic alternatives used in India

2.2.1 Biodegradable and compostable bags

According to Raghunathan *et al.* (2025), biodegradable and compostable packages have gained popularity in India in the last couple of years and have been utilised as a substitute for the traditionally used single-use plastic bags. These bags are usually constructed of natural polymers like Polylactic acid (PLA) or maize starch or cassava starch, and decompose at a quicker pace than plastic in certain circumstances. The interest in alternatives has been caused by the growing awareness of the environment and stricter regulations on the use of plastics in certain Indian states. Dey *et al.* (2024) note that, unlike traditional plastic bags, a biodegradable plastic bag would be disposed of to break down into carbon dioxide, water, and organic matter, therefore having a minimal longer-term impact on the planet. Switching to the use of these bags is not, however, a simple thing. Depending to the fact that they have the same texture and appearance, individuals continue to mix up the biodegradable bags and the regular ones made of plastic. In addition, the

biodegradable bags need industrial composting plants to break them down, and industrial composting plants are not so easily found in India. One of the consequences is the fact that customers come with varied expectations and have a real influence on the environment. With urban markets increasingly popular, these obstacles would not halt the growth and popularity of biodegradable and compostable plastic bags. They are being offered as such in supermarkets, food delivery companies and merchants with green consciousness.

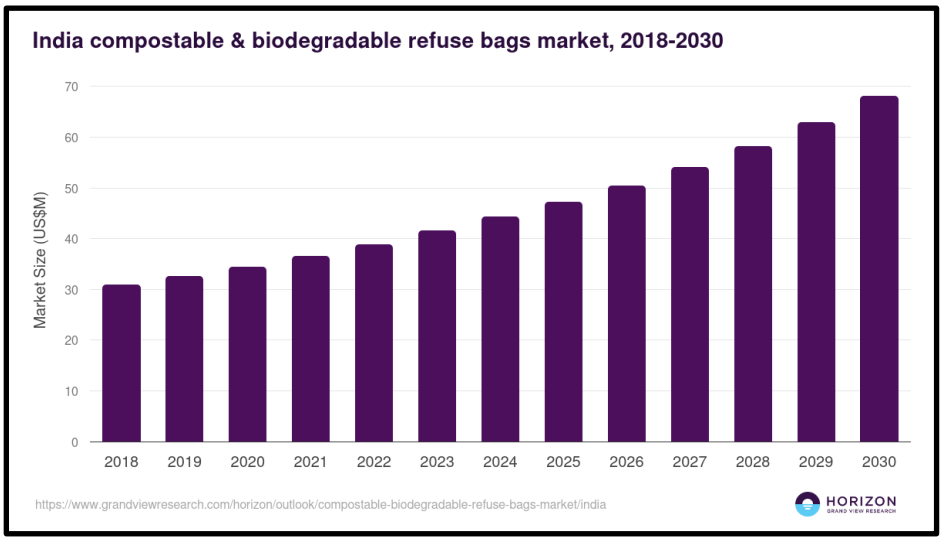

Figure 2.1: Biodegradable and compostable bags market in India

(Source: Grandviewresearch.com, 2025)

According to the graph above, the Indian market for biodegradable and compostable garbage bags is expected to produce US$68.1 million by the year 2030. It is predicted that the Indian waste bags, compostable, and biodegradable market would grow at a compound annual growth rate of 7.6% between 2025 and 2030 (Grandviewresearch.com, 2025). The increased regulatory backing is also another reason that made them popular, since most state governments provide incentives to produce environmentally friendly packaging. True to the customer perspective, the use of biodegradable bags is often associated with social norms, and most individuals associate the use of the bags with responsibility towards the environment.

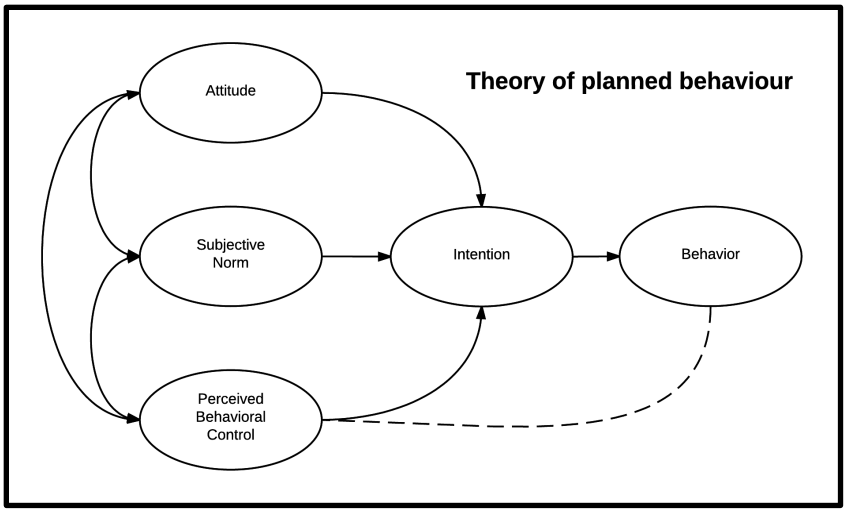

Figure 2.2: Theory of Planned Behaviour

(Source: Idea taken from Hagger and Hamilton, 2024)

Nevertheless, affordability continues to present a challenge since biodegradable bags are at times more costly than the usual plastic bags. These options might, however, become more available when the economies of scale and technology mature. Compostable and biodegradable bags are another material change, but also a behavioural one in India, where people just do not understand why they should be using a kinder substance or kinder bag to be comfortable. According to Hagger and Hamilton (2024), such change can be attributed to the "Theory of Planned Behaviour", which is the opinion as regards to the ability and intention to use biodegradable bags and, indeed, actual adoption of biodegradable bags in India is a complex of subjective norms, attitudes, and perceived behavioural control in India.

2.2.2 Areca leaf products and Bagasse packaging

According to Roy (2023), products made of sugarcane bagasse and the leaves of the areca palm are another popular type of plastic alternative in India. The resources are readily available across the country and provide long-lasting options to one-use plastic packaging and dinnerware. Areca leaves are collected and washed, and then pressed into service trays,

bowls, and plates when they fall naturally off the palm trees. Similarly, the discarded fibre that can be obtained after the juice of sugarcane is taken out is also shaped into cups, containers and wrappers, known as bagasse. They can best serve large events, food service, and fast food restaurant businesses because they can be readily renewed and are biodegradable. Cultural resonance of these alternatives is one of the reasons why they are adopted in India. According to Pavithra *et al.* (2023), natural leaf plates have not been used for the first time. It has been a long-standing practice of several Southern Indian cultures to serve food on banana or areca leaves during festivals and ceremonies. This method has been modified in order to make durable mass-produced dinnerware, and this has made it more applicable in modern lives. Bagasse packaging also works so well with the Indian agricultural background. Sugarcane is cultivated almost everywhere in the country, therefore making the raw materials of these products easy to obtain and keeping other income sources open to the farmers. Due to their natural derivatives, as well as the absence of harmful components, people tend to regard areca and bagasse products as healthier and safer to consume. However, since such goods are often sold at a higher price tag than the plastic versions of such, pricing remains a factor in their acceptance. Another shortcoming is durability because the bagasse containers can become weaker, especially after a long stay in liquid. Such challenges have, however, made areca leaf and bagasse packaging an attractive alternative due to the emerging need to eat responsibly, environmentally and stipulation laws on the use of plastic. They represent an approach that is firmly rooted in Indian agriculture and culture as well, and follows an eco-friendly pattern.

2.2.3 Reusable metal and glass containers

As reported by Kanwar *et al.* (2023), reusable glass and metal boxes are developing elsewhere as an alternative to single-use plastic, often in urban areas where environmentally conscious consumption is on the rise, as well as in India, where these surfaces have become a preferred option. Stainless steel containers, to be precise, stainless steel food carrying and storage containers, have been in Indian homes for many years. Stainless steel lunch boxes, bottles, and tiffin carriers are perceived by many customers as

durable and plastic-free options, and reimagining an existing cultural practice through the angle of sustainability. Conversely, due to glass containers being non-toxic and containing food without any risk of transmission of harmful chemicals, as it is indicated, glass containers are increasingly being marketed as containers to store both dry food, liquids, and remains (Dybka-Stępień *et al.* 2021). The two materials are compliant with the international standards of sustainability as they are highly robust, recyclable, and reusable. In an effort to a certain extent, the increased popularity of glass and metal containers is achieved through health consciousness, pragmatism, and nostalgia. Although the glass containers are perceived to be more upmarket and hygienic for storing food, most of the Indian customers associate steel continuous with reliability and durability. They are more expensive to purchase than single-use plastic up front, but exceed longer with time due to their durability. They are, however, adopted by various socioeconomic groups at varying rates. Affordability remains an obstacle to acquiring glass and metal goods since their costs are higher at the outset as compared to cheap plastic substitutes that most low-income earners would be able to purchase. One of the arguments supported by Gallucci *et al.* (2021) was that even glass containers had weight and fragility problems, and this made them useless outside. Nonetheless, the reusable continuous shift proves the emerging trend among Indian consumers' behaviour, who are less resistant to including sustainability in their everyday routine as long as it continues to fit tradition and common sense. Delivery services, as well as restaurants, are testing reusable packaging solutions, including the return of the steel tiffins. Overall, the resurgence of reusable containers made of glass and metal indicates how much famous tried and tested materials can give a long-term solution to the problem of plastic in India.

2.3 Lifecycle assessment for different types of plastic, including paper, glass, aluminium, and bioplastics

2.3.1 lifecycle assessment for plastic alternatives

According to Rosenboom *et al.* (2022), it is clear that no one material is entirely cheap in terms of environmental costs when contrasting the costs of plastic alternatives, such as

paper, glass, aluminium and bioplastics. Life cycle assessment or LCA considers the process of extracting, manufacturing, distributing, using, and disposing of a material, and offers a systematic way of understanding these effects. As an example, since paper decomposes faster than plastic, in some cases, paper is touted to be an environmentally inert alternative. Nonetheless, its manufacture takes large amounts of water and energy, and unless raw materials are obtained responsibly, it can also lead to deforestation. According to Pereira *et al.* (2025), the glass-manufacturing process, on the contrary, consumes plenty of energy as it must be heated to high temperatures, but is constantly recyclable, and does not lose its characteristic in the course of the recycling procedure. Bioplastics made out of renewable materials such as sugarcane or maize starch bring a reduction in the use of fossil fuels. But to decompose well, often special composting factory conditions are needed that India currently does not have on a large scale. Aluminium packaging also needs a lot of energy to manufacture, and yet it is recyclable. LCA framework helps demonstrate such trade-offs and reminds that to reduce environmental burdens, infrastructure and consumer decisions need to coexist. Indian clients are slowly becoming aware of the fact that even such an eco-friendly alternative can possess hidden costs in the process of its existence. Such heightened awareness reveals the fact that sustainability is an ongoing process of balancing environmental effects on many different axes as opposed to a quintessential solution.

2.3.2 lifecycle assessment of aluminium in compassion to plastics

Zhao *et al.* (2025) state that aluminium has been very popular in food packaging containers, food packaging, and beverage cans, as an alternative to single-use plastic. Aluminium extraction processes, such as initial production via high-temperature smelting and large-scale bauxite mining, are highly energy-intensive in accordance with a lifecycle perspective. The processes lead to ecological disturbance and high emissions of greenhouse gases. Nevertheless, the advantage of Aluminium is that it is recyclable. Unlike plastic, aluminium can be recycled again and again without compromising the quality, as compared to frequently downcycling plastic into lower-valued products. Even recycling aluminium

is an option that is environmentally friendly in the case where a strong recycling infrastructure exists, as the recycling process consumes 95% less energy than the primary manufacturing process. Nonetheless, the recycling capacity of India is pretty distributed, and much of it relies on the unorganised industry.

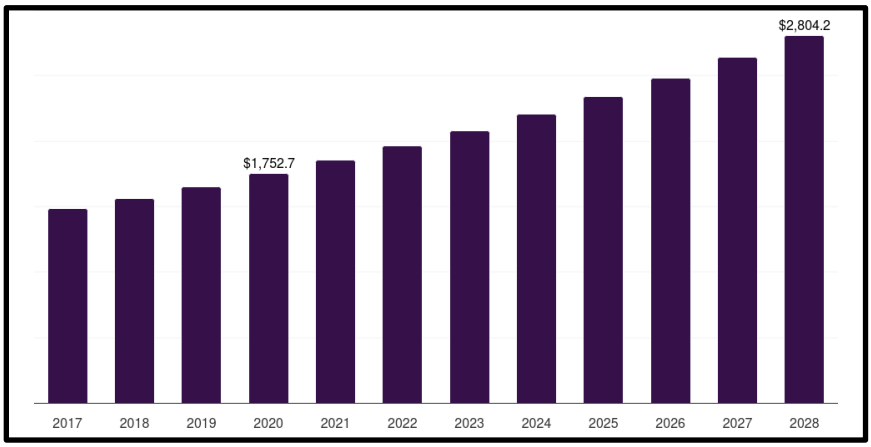

Figure 2.3: India aluminium foil packaging market 2017 to 2028

(Source: Grandviewresearch.com, 2025)

According to the graph above, the Indian aluminium foil food packaging market is expected to produce sales of US$2,804.2 million by the year 2028. It is expected that in the period of 2021 to 2028, the Indian aluminium foil packaging market would grow at a rate of 6.1% compounded annual growth rate (Grandviewresearch.com, 2025). Thus, though theoretically aluminium cans and packaging can be recycled, the extent to which consumers and the waste management system in an area collect and recycle items would limit their use in creating real-world impacts. Whereas the aluminium products are longer-lasting and more durable than the plastics, they also cost more to cover in both the economy and environment in terms of start-up costs. Indian customers are beginning to identify aluminium containers as premium, long-lasting and safe options, especially in food and drink. But wide adoption would require the expense and upgrading of the recycling infrastructure in India. Thus, the lifespan analysis of aluminium can be instructive in illustrating an important lesson that, to deliver genuine environmental benefits, material

substitution requires support of efficient infrastructure and consumer take-up. In the absence of it, the realisation of the potential of aluminium as a substitute for plastic is in jeopardy of being realised partially.

2.3.3 lifecycle assessment of plastics and its environmental impact

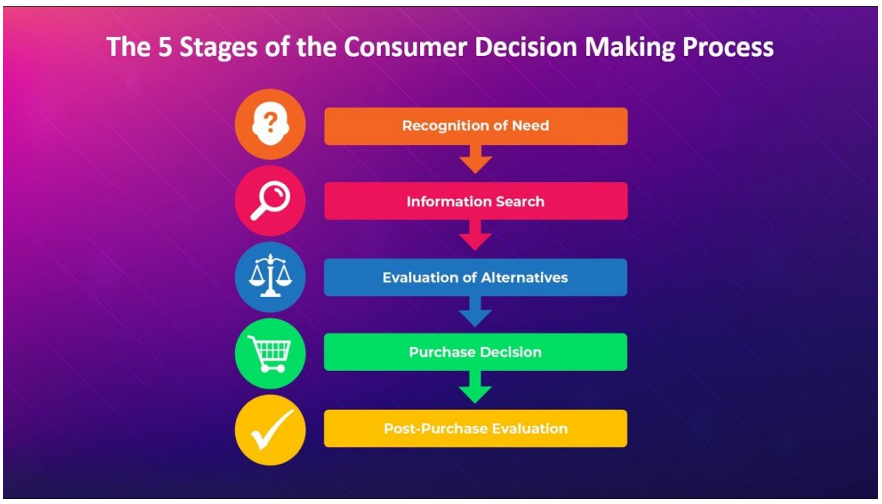

Figure 2.4: Consumer Decision-Making Model

(Source: Idea taken from Roy and Datta, 2022)

According to Atiwesh *et al.* (2021), the shelf life of the conventional plastics that are primarily petroleum-based explains why they are recurring environmental problems. The use of plastic in various industries is widespread owing to its low weight, cheapness. Nevertheless, a substantial part of greenhouse gas emissions can be attributed to the use of fossil fuels in the production of plastic. Plastics may appear efficient during their use due to the fact that they reduce transportation-related emissions because of their lightweight characteristic. But it is in the end-of-life that the greatest concern is. Unlike recycling or biodegradable products, plastics are known to be difficult to deal with when disposed of. The low reusability can be ascribed to the fact that most types are not easily recyclable and that, that involves materials of necessity, materials often depreciate in quality. Significant sizes, thus, end up in the river, the seas, or the landfills, where they are left to stay for hundreds of years. Wear and tear are leading to the hidden danger of microplastics that

enter the food systems and potentially harm human health. The exposure to plastic garbage in the city and the villages reminds the Indian customers of the lifetime burden of plastic garbage constantly. The Consumer Decision-Making Model is one of the best ways to help understand consumer behaviour (Roy and Datta, 2022).

Plastic pollution has become an aspect that many people now see as a social issue in the problem recognition stage. In making their choices, they often incorporated the perceived ease, availability and cost. Nevertheless, on economic grounds, the purchase decision still often goes to low-cost plastics. The ineffectiveness of the level of consumer behaviour that is coupled with the unawareness of the concerns for the environment, highlights the significance of the changes in regulations, education, and affordable substitutes. Environmental disasters such as plastic would remain until consumers' decisions align with sustainable end-of-life results.

2.3.4 Comparison of all biodegradable materials based on their lifecycle stages

Lifecycle analysis indicates the major trade-offs between paper, bioplastics, and areca leaf and bagasse packaging materials, which are biodegradable. Abushammala *et al.* (2023) stated that the production of paper, despite being biodegradable, is energy-intensive and requires large amounts of water and, in case such provision is unsustainable, leads to deforestation. Though bioplastics also reduce reliance on fossil fuels, efficient degradation of the bioplastics would also need industrial composts, where none exist in India. Being made with naturally fallen leaves that do not need much production, areca leaf goods are unique as well. They are relatively environmentally friendly, even though their manufacture is limited to the regions where the vine grows (areca palms). Bagasse packaging is created with sugarcane by-product, which makes agricultural waste a rich source and minimises pressure on landfills (Patil *et al.* 2023). Though it has a very low emissions average lifespan, it has durability issues, however. Areca leaf and bagasse products have the most desired balanced environmental impacts as compared to all the stages, especially in the Indian context, due to the use of agricultural byproducts. Although it can be said that bioplastics and paper are good, they still require additional support on

the industrial level and more ethical production approaches to minimise the adverse impact. Such differences do not always become obvious to Indian audiences. Terms such as the use of biodegradable or eco-friendly may be causing the effect that both replacements are equally environmentally friendly. The fact that not every biodegradable material has the same impact on the environment, however, is not easy to view from a lifetime perspective. Social cognitive theory can be applied in the scenario when observational learning is concerned. Adoption of such sustainable habits is more by customers when they see that their friends and neighbours use areca leaf and bagasse products at some of the social functions and gatherings.

2.4 Perception of consumers about the benefits and drawbacks of using plastic alternatives

2.4.1 Knowledge and awareness of consumers about plastic alternatives

Dowarah *et al.* (2022) point out that despite the variations in terms of location and social status, the awareness of alternatives to plastics among Indian consumers has been increasing steadily, even though some might have a better understanding of the topic than others. Metropolitan customers would witness campaign, store initiatives and law-guided bans that promote environmentally friendly and environmentally sound alternatives, such as biodegradable carrier bags, areca leaf bowls and reusable steel or glassware. Although an awareness of knowledge of technical specifications, such as biodegradability or recycling procedures, may not yet exist, this exposure still has a tendency to increase awareness. Customers in rural areas, however, would be able to use the traditional ways, such as using jute bags, plates made of leaves, or pots made of clay, without crowding them as an alternative to plastic. The meaning of this is that cultural practices and formal education initiatives are not the only contributors to awareness. According to Anjimoon *et al.* (2024), the plastic alternatives are perceived by and associated with many customers as socially desirable and are even associated with modern, eco-friendly lives. However, misinterpretations persist. As an example, one may believe that all biodegradable materials break down on their own in any environment, but many of them indeed require compost in

an industrial environment. Similarly, all customers are yet to be fully informed of the costs to the environment posed by alternative materials such as paper or bioplastics. These awareness gaps reveal that consumer comprehension very often lies on the border between pragmatism and ambition. The urge to implement the use of sustainable materials may be huge, but decisions are not made on the basis of all the facts. This underlines the utility of consistent awareness raising, readable labels, and instructions that relate consumer behaviour to more important environmental impacts. It is through such apparent understanding, which is easy to relate to, that customers are more likely to embrace an alternative as a mature long-term lifestyle decision as opposed to a mere fad.

2.4.2 Perceived environmental impact of using plastic by consumers

According to Pathak and Nichter (2021), the detrimental impact of plastic on nature has already turned into a practical reality for many Indian clients. It is common to have a litter of plastic waste in the streets of cities and towns, congested sewers, and filled landfills. Due to their visibility, plastics have been regarded as a serious environmental issue that brings about health risks when they cause garbage to pollute the soil, water, and even food. The customers regularly describe plastics as convenient but harmful, which marks a duel of knowledge against dependency. Even though people understand that plastics decompose in several hundred years, they still use the materials as a daily necessity because it is readily available and affordable to them. As such, non-plastic alternatives have recently been found to be a solution to reducing these adverse impacts. Most of the customers believe that reducing litter and long-term waste, switching to reusable containers, natural dinnerware, or even biodegradable bags would instantly benefit the environment (George and George, 2023). However, the perceptions do not always rely on lifetime knowledge. As an illustrative example, not many consumers are aware that bioplastics do not necessarily decompose in the wild or that paper bags use more energy and water to produce. Instead, the environmental impact is often judged on external symptoms. There is an intuitive feeling of preferring a leaf-made plate or a bag, sold as eco-friendly, to a regular plastic one. This impression, despite the complexity of the truth of scientific truth is potent

because it guides behaviour. This shows the importance of bridging the gap between perception and evidence to businesses and politicians.

2.4.3 Knowledge of consumers about the cost, durability, and availability of plastic alternatives

The adoption of alternatives in place of plastic relies immensely on the attitude of consumers and their perception of availability, affordability, and durability. One of the concerns of Indian customers the most frequently is affordability. According to Gaisie (2025), in the case of households having a tight budget, solutions such as biodegradable bags or packaging material made out of bagasse are less attractive because they are often more cost-effective than their plastic analogues. Frequently, low-income customers believe they are excluded from these alternatives, although middle-income and upper-income consumers may be ready to spend more of their money to pursue sustainable living. Durability also plays its part in terms of perception. Although there is good reason to question the product of plastic, many individuals still believe in it since it is sturdy, waterproof and easily transportable and stored. Alternatives such as the use of paper bags have often been considered as less effective, in particular in places where there are frequent monsoons, as paper bags can easily tear. As well, biodegradable materials may not necessarily provide equal durability. On the other hand, Muranko *et al.* (2021) stated that reusable options such as glass or steel containers are considered to be more durable, although they are more expensive and might not be used because of this price. Availability also influences decisions made by customers. Eco products are increasingly being recognised in supermarkets, online stores, as well as eco-retail outlets in large cities. Other substitutes, however, might prove hard to find in the rural areas and small towns, leaving the customers with the option of continuing to use plastics. This inconsistency of access promotes the notion that sustainable choices would remain a luxury, not a norm. Environmental consciousness is equally taken into account in the end by customers when they are making decisions after considering availability, affordability and durability. It is described through the consumer decision-making model, the idea of which is the evolution

of the consumer from recognising that plastic is a problem to considering the alternatives and finally picking the products that represent a balance between environmental and social responsibility and their convenience.

2.5 Overall impact of plastic alternatives on the environment

2.5.1 Analysis of the use of alternatives to reduce the amount of plastic waste in landfills and natural environments

According to Fayshal (2024), the emergence of plastic alternatives has been heralded by many as a way to reduce the quantity of plastic waste that one finds in rivers, landfills, and the ocean. The conspicuousness of plastic waste compounds the benefits of alternatives all the more in India, where urban waste systems are often overloaded. To reduce the amount of non-biodegradable waste in landfills, one can use biodegradable bags instead of the general plastics or use areca leaf plates or bagasse containers. Most of these alternatives decompose much quicker and leave fewer residues than plastics do, which remain in the same condition even after thousands of years. Also, their application would reduce the risk of plastics finding their way to natural locations, where they may act as habitat destroyers and disrupt ecosystems. A deluxe package, however, depends on size and consumer behaviour. The use of adoption should be prevalent, as this would offer decent reductions in plastic pollution. Also, the waste management infrastructure should have the capacity to manage compostable and biodegradable garbage in the right way. Even the alternatives can be subject to landfill pressure in the event of inappropriate disposal (Wojnowska-Baryla *et al.* 2022). At that, considering all the available data, alternatives are a great step forward, yet only the extensive application of such mechanisms, accompanied by proper garbage disposal systems, can lead to their potential realisation.

2.5.2 Various alternatives used in decomposition in the natural environment

One of the primary ecological advantages of plastic replacements is the ability to degrade as part of a natural process. As an example, according to Nayak *et al.* (2021), the areca leaf plates break down quickly in the soil and do not cause any dangerous outcomes. Also,

bagasse packaging is made out of cane waste sugar, which disintegrates extremely fast and is converted into organic matter capable of enhancing the soil. If not in other ways specified by the circumstances, paper goods can be biodegraded within weeks or months, whereas biodegradable bioplastics may require a longer time, still possessing a shorter life during which time they can be disposed of. This elimination through the process of natural decay reduces the threat to farmlands, waterways, and wildlife by reducing the level of persistence of trash in the natural setting. It is not necessarily easy to deconstruct. Industrial composting facilities that have high temperatures and specific microbiological conditions are necessary to ensure the degradation of certain bioplastics categorised as eco-friendly. In the absence of these facilities, they could extend further than envisaged and create a misunderstanding among customers. The rate of decomposition is also influenced by environmental variables such as temperature, moisture, and sunshine, which are highly variable all over India (Ahirwal *et al.* 2021). Agricultural by-products, such as leaves or bagasse, are best-suited to rural regions when the compost is made outdoors. Taken together, although decomposition of most substitutes is arguably their most significant benefit, it is important to ensure that disposal paths enable these materials to disintegrate naturally, and to align customer knowledge with realistic discoveries.

2.5.3 Environmental costs of manufacturing alternatives, such as water use, energy use, and raw material sourcing

Although one would automatically assume that plastic alternatives would be considered more environmentally friendly, large environmental costs do come with their production. As an illustration, paper bags would require much energy and water, and deforestation may occur when using the unsustainable sources of wood pulp (Jiang *et al.* 2021). Glass containers are sturdy and can be recycled, but the creation of glass via melting and moulding takes a lot of energy, leading to high production of greenhouse gases. The production of bauxite through mining, smelting makes it one of the most energy-intensive processes to manufacture original packaging, but even after recycling, aluminium packets can be recycled indefinitely. As Rai and Choure (2023) explained, despite their renewable

nature, even bioplastics often rely on such crops as maize or sugarcane, thus evoking the risk of land use and competition in terms of food production. These issues are particularly relevant in India, where energy limitations and food needs would have to be balanced against resource use. This shows where the pseudo-goods of plastic substitutes are contradictory: even though they are less likely to contribute to the volume of trash that goes into nature, still, their production may still pose a burden on natural resources.

2.6 Impact of plastic alternatives on reducing environmental pollution and improving sustainability in India

The plastic pollution problem experienced in India has led to a high pace of seeking relevant alternatives that reduce leakage of materials into rivers and coasts, town litter, and a move towards material durability. Consequently, even though no single or universal substitute is better than the other, intelligent mixes between reusable systems and recyclable materials (Vanaraj *et al.* 2025). Accordingly, those materials that are really biodegradable, put in perspective with the source segregation and high-quality collection, are displaying quantifiable returns.

2.6.1 Examination of alternatives to plastic that have reduced pollution in rivers, coastlines, and urban waste streams

Alternatives are most useful where they reduce the risk of litter, are compatible with existing recovery systems, or remove long-term plastic micro risks. In accordance, reuse of serviceware and packaging is one important alternative (Fetner and Miller, 2021). Thin carry bags and fragile carry bags, and disposable food containers, which are normally littered in the markets and supply chain, are replaced by steel, melamine-free bamboo, and durable polypropylene crates. Similarly, movable events, work-place canteens and fast-food outlets upgrading to washable plates and tumblers report fewer hygienic concerns and less litter escaping to the street, then to storm-drains and rivers. Accordingly, paper and board with aqueous-like, not plastic barriers, is also crucial. Dry goods, bakery products, and secondary packs can be deprived of a lot of plastic film leakage by using paper or

board, which can be easily equipped with aqueous barriers. Paper is more often collected using the informal recycling system or kabadiwalas because it is more visible and heavier, reducing the likelihood of it finding its way into waterways (Chawla and Kumar, 2022). However, barrier decisions say that plastic-coated cartons are more salvageable in low-level infrastructure environments as compared with plant-based or wax-coated finishes.

On the other hand, plant-fibre alternatives are increasing in the current timeline. Plastic made from plates and bowls manufactured out of bagasse or sugarcane residue and moulded fibre makes it less dependent on multi-layered plastic (Eissenberger *et al.* 2023). They can be composted in decentralised systems when not contaminated with food and laminates, reducing the volume of mixed wastes. Accordingly, fibre serveware has largely reduced the amount of lightweight plastic debris on shorelines in litter towns where local composting is practised. Consequently, cloth or Jute carry bags are another significant alternative. Based on this, thin, carry bags can be replaced by heavy cloth or jute bags, which can greatly increase efficiency in reducing litter on the road, a significant factor of drain blockages in Indian cities (Conlon, 2023). The performance in terms of environmental benefits is contingent on the reuse rate. Similarly, the schemes facilitating the reuse or repair of bags would contribute to such results. Moreover, beverage glass or metal, including returnable glass bottles and aluminium cans, have a structure for collecting beverages. Hence, deposit-refund or buyback systems drive up recovery rates and ensure that containers do not get into the rivers and coasts (Prasad *et al.* 2024). The relatively high value of aluminium scrap acts as a motivator to collect it even out of informal dumps.

In addition, truly biodegradable plastics in niche applications are also effective. Niche use of certified compostable liners that are only being used to segregate wet waste can lower the use of traditional plastic bagging, which can break up in the environment (Allison *et al.* 2024). However, they can only become advantageous when collected correctly and composted or digested in biogas. Otherwise, they are treated as regular plastics. The uncertified biodegradable product with no infrastructure has little pollution prevention. Hence, the uniting element has been called fit-to-infrastructure, reusable, or valuable

materials that meet the criteria of being recyclable or compatible with existing composting treatises. Moreover, these are, in fact, an inclusive element in reducing leakage into drains, rivers, and beaches.

2.6.2 Investigating resource recycling and sustainable waste management techniques in India, supported by biodegradable and reusable alternatives

Alternatives have the potential to support the whole waste system by enhancing source segregation, collection economics, and processing efficiency. In accordance, segregation is effective**.** Based on this, keeping organic waste, disposable fibre such as takeaway boxes, and compostable packaging or liners substantially minimises plastic contamination of compost (Allison *et al.* 2024). This helps enhance quality and take-up by urban agriculture and landscaping. This, in turn, reduces the amount of mixed waste that needs to be transported to landfills and liberates municipal capacity to concentrate on the recovery of dry waste. Accordingly, material recovery facilities or MRFs and their integration with the informal sector significantly help resource recycling and sustainable waste management **(**Khajuria *et al.* 2025**).** Paper, metal, and glass substitutes fit in rather well with India already having such a robust informal recycling economy (Conlon, 2023). These materials are easy to sort, and their resale value does not decrease, which contributes to the volume of throughput and margins of kabadiwalas and MRFs. Moreover, recovery rates increase with policies that institutionalise buyback centres and provide visible price boards.

Apart from these, decentralised composting and bio-methanation are other important waste management techniques (Kumar *et al.* 2025). In systems where municipalities or institutions run their composting or biogas processing at the ward level, fiberware and certified compostables, which are just food-contact items, enhance feedstock purity, decrease screening loss, and mitigate risk of microplastics in the compost. This helps transform waste that would have been in a landfill into soil conditioners or biogas, making progress towards circularity goals. In contrast, other crucial techniques include refill and re-use logistical solutions. Dispensers of bulk products like grains, pulses, and detergents, and reusable transport packaging in online sales limit the second and third plastic films that

are difficult to recycle. Hence, a reuse prevents material throughput at the point of origin, relieving the collection fleet and landfills and enhancing life-cycle impacts.

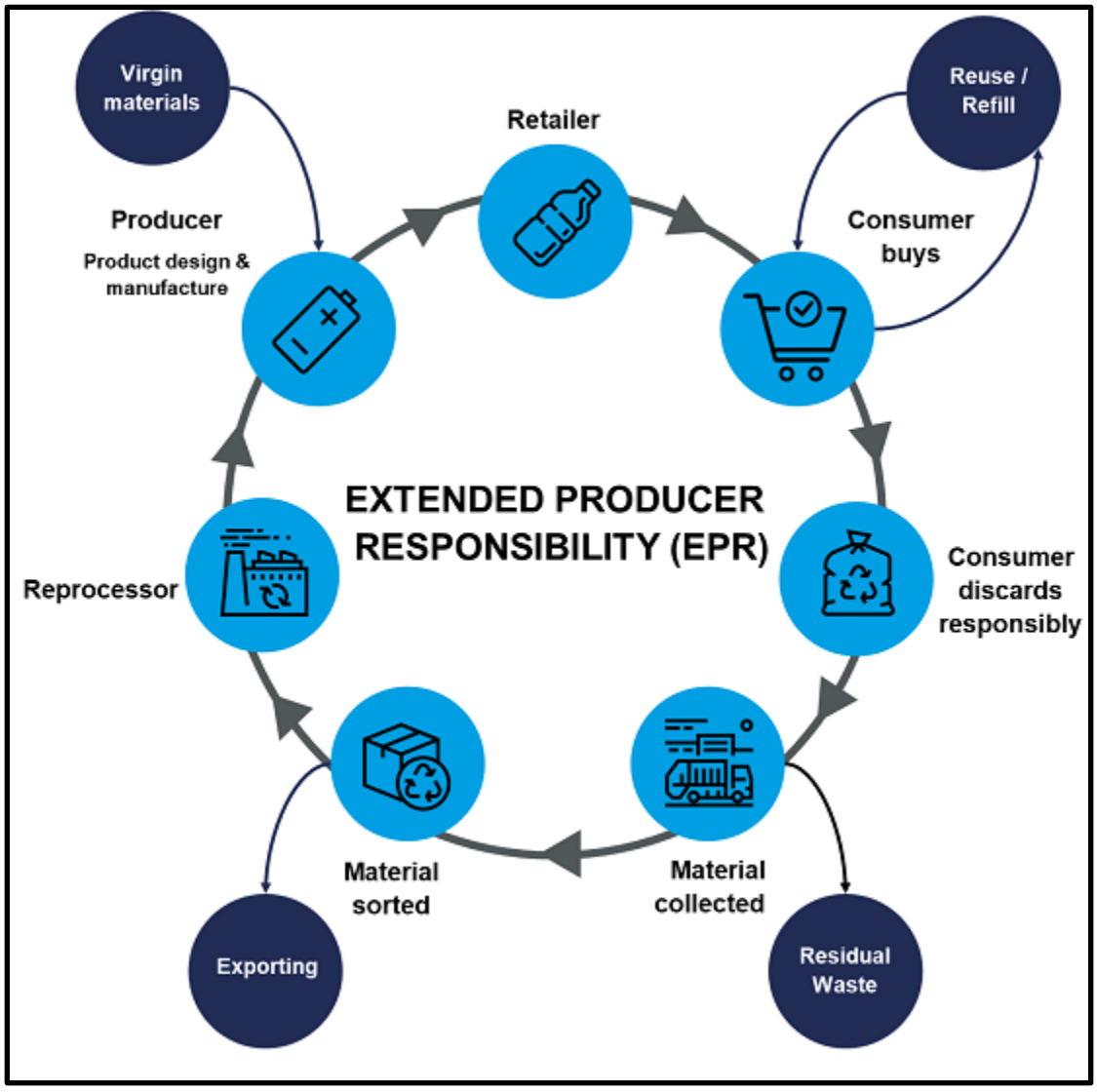

Figure 2.5: Extended Producer Responsibility or EPR framework diagram

(Source: Idea taken from Kumar and Bhati, 2022)

Moreover, designing with recyclability in mind is also crucial. The dependence on multi-layer, flexible plastics should be reduced to mono-material materials like PE or PP film, designed to be locally recycled and to recyclable paper or metal formats. These decisions,

when combined with Extended Producer Responsibility or EPR frameworks and take-back channels, increase the effectiveness of recycling rates and decrease residuals (Kumar and Bhati, 2022). Furthermore, data traceability, like alternatives EPR-linked credits and electronic tracking, contributes to brands investing in collection in the territory of product sale. This produces a positive feedback loop for improving design decisions, including reusable, recyclable, compostable, and infrastructure-ready also garners compatibility at reduced expense, driving the market to avoid the difficult-to-manage plastics.

2.6.3 Use of substitutes to help producers and consumers adopt environmentally friendly methods that support sustainability objectives

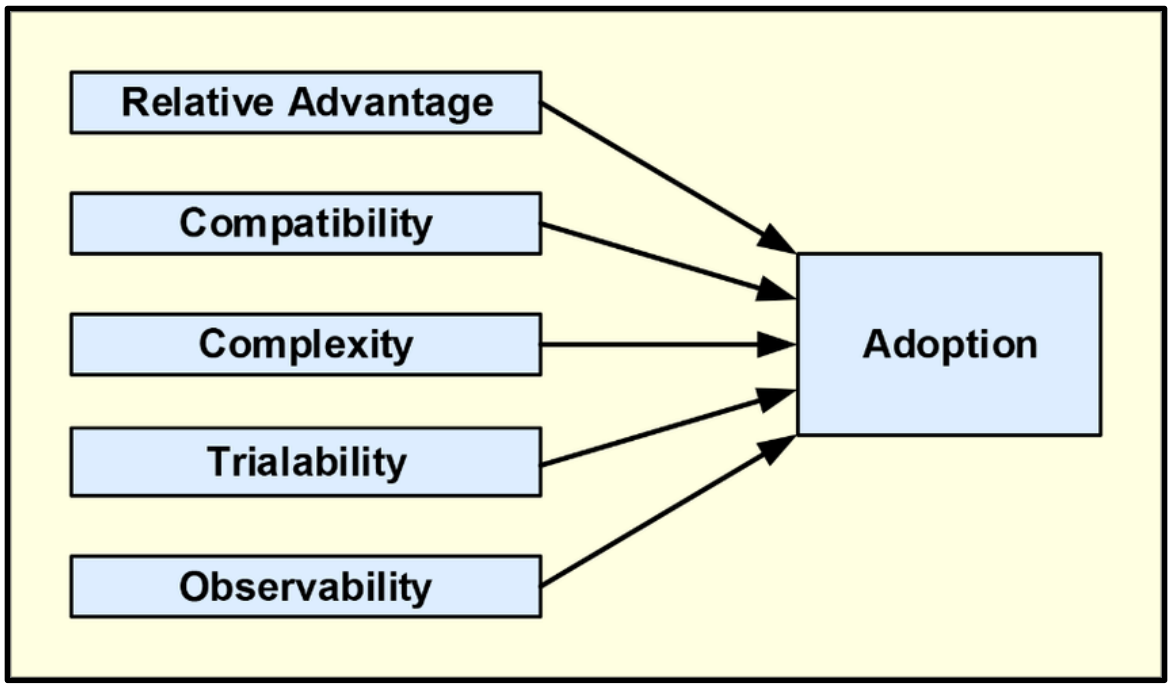

Figure 2.6: The Diffusion of Innovation Theory

(Source: Idea taken from Herbst and Barner, 2024)

The key to turning the alternatives transformative is triggering behaviour and business model change. In accordance, substitutes provide feasible plastic reduction, carbon, and circularity KPIs roadmaps. Packaging regimens like reusable packaging systems, B2B of

crates, and reusable bottles dampen supply prices and help to decrease virgin plastic volatility. Accordingly, recycled-content goals and storytelling of brands around circularity using paper, metal, and glass also significantly help (Lahl and Zeschmar-Lahl, 2024). Moreover, under compostable products, where appropriate, the products shall be confined to the applications linked to organics to enable firms to achieve their objectives of litter reduction without greenwashing. The diffusion of innovation theory states the ways consumers adopt new ideas or products across stages like innovators, early adopters, early majority, late majority, and laggards (Herbst and Barner, 2024). Hence, according to this theory, adaptation of plastic alternatives depends on the ways consumers and producers cease their relative advantage, compatibility, complexity, reliability, and observability (Herbst and Barner, 2024). These factors significantly influence early adoption and accelerate wider acceptance of sustainable practices across society. Consequently, the replacement of disposable serviceware with standardised and wash-and-reuse serviceware or to be washed on-site can help lower the overall cost of ownership in the long run, cut waste-handling costs, and enhance customer experience. Simultaneously, prominent reuse depots and deposit-return of cups or vessels normalise circular behavior and reduce litter in the front-of-store.

Apart from these, low-waste living is convenient with durable bags, bottles, and lunchboxes. One form of nudging, tiny deposits, refill rewards, and delivery app defaults of no cutlery or no sachet tend to shift decisions with no loss of convenience (Muranko *et al.* 2021). Similarly, the connection of community composting with compostable liners makes households the creators of healthy soil in local areas, which further proves the significance of segregation. Moreover, procurement specifications that emphasise reusables and mono-material recyclables decrease downstream waste management costs (de Jong *et al.* 2025). Hence, campus, hospital, and transport hub pilot programs provide scalable operational feasibility and examples of municipal by-laws that support the reuse infrastructure, like washing facilities, reverse vending machines, and refill counters.

Overall, plastic substitutes decrease the pollution of the environment in India when combined with the available recovery channels and integrated into the circular economy. Reusables reduce generation at the source. Accordingly, recyclable paper or metal, or glass, increases recycling of plastic and prevents littering, and carefully scoped compostables enhance diversion of organics (Conlon, 2023). These substitutes, combined with the active policy, EPR, and behaviour change, assist producers and consumers in the pursuit of sustainable goals, as well as providing them with visible results such as cleaner rivers, coastlines, and cities.

2.7 Role of government and business organisations in shaping consumer behaviour in India

The shift in India towards environmentally friendly plastics, alongside the replacement of conventional ones, also means that the government and business organisations must have a direct influence on the development of such plastics. The two are essential in determining consumer preference, industry standards, and the creation of the enabling conditions in which the sustainable activities are available and enticing (Fu *et al.* 2023). These players impact consumer behaviour through regulatory initiatives and measures, campaign and education programmes, corporate commitments, and associations to increase the pace of the transition towards environmentally responsible consumption.

2.7.1 Implementation of public awareness campaigns, subsidies for environmentally friendly products, and prohibitions on single-use plastics

The Indian government has gone the extra mile in disincentivising single-use plastics and incentivising sustainability. Accordingly, a significant intervention is the prohibition of some single-use plastics, including straws, spoons, forks, plates, and polystyrene, which came into effect in July 2022 under the Plastic Waste Management Rules (Pib.gov.in, 2022). This prohibition also directly reduced the offer of certain single-use products and pushes the consumer to use reusable or biodegradable substitutes. Similarly, it is also very crucial that there be public awareness campaigns. Accordingly, the move towards waste

segregation has been promoted through native movements and worldwide campaigns like the Swachh Bharat Abhiyan, in addition to educating consumers of the environmental downsides of their day-to-day decisions in the long run (Pmindia.gov.in, 2025). The awareness is created through school programs, social media campaigns, and through advertisements placed at places that can be seen by the masses. Moreover, producers and consumers are given subsidies and incentives in order to further encourage sustainable conduct. In addition, to illustrate, some state governments subsidise the small-scale industries producing jute or cloth, or canvas versions of the bags. The government also makes GST reductions on more environmentally friendly products, which also makes the substitute cheaper (Conlon, 2023). Hence, these efforts ensure that environmentally friendly products are affordable, thus stimulating consumers to use them.

2.7.2 Green marketing and corporate social responsibility (CSR) businesses support environmentally friendly packaging, and finance environmental projects

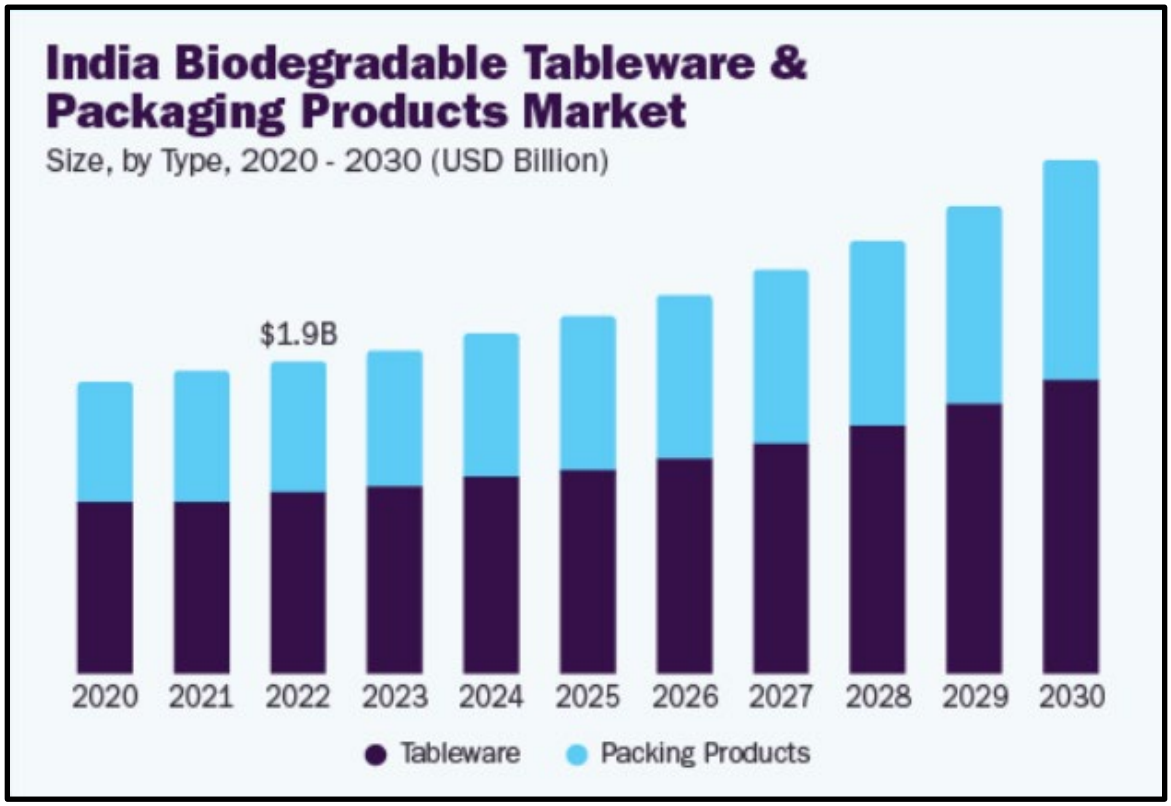

Figure 2.7: The indian market of biodegradable tableware and packaging products till 2023 and with a forecast till 2030

(Source: Grandviewresearch.com, 2025)

Companies have come to embrace green marketing practices to attract those consumers who are friendly to the environment. Innovations in packaging, including food containers made of biodegradable plastic or paper straws or shopping bags, compostable or more generally non-plastic and glass bottles that can be returned to a closed-loop factory. In accordance, the biodegradable tableware and packaging products market size in India was 2.06 billion in 2023 (Grandviewresearch.com, 2025). Accordingly, this value has been projected to increase with a growth rate CAGR of 6.0% from 2024 to 2030 (Grandviewresearch.com, 2025). These significantly help the adverse environmental effects of plastic-based materials on air, water, and land, ultimately driving manufacturers and consumers to seek safer and biodegradable alternatives. Similarly, they are marketed not only as functional and efficient solutions but also, and foremost, as a mark of consumer responsibility. Hence, this helps create an image of sustainability and advertising environmental added value.

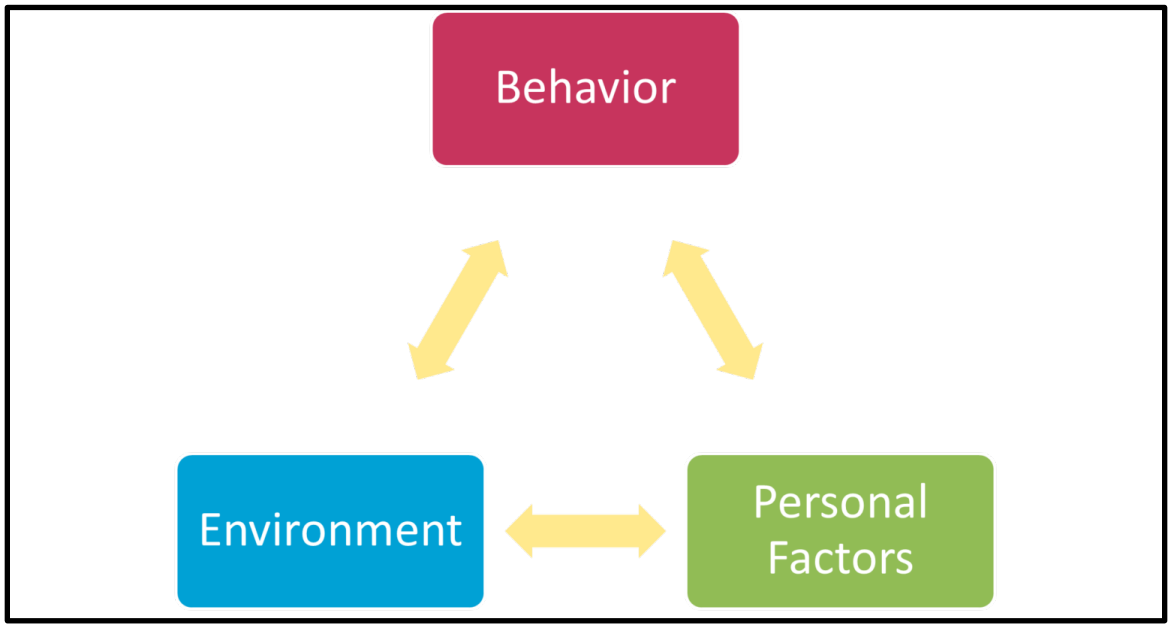

Figure 2.8: Social Cognitive Theory

(Source: Idea taken from Dreyer *et al.* 2022)

Companies shape the consumer's perception and normalise that sort of eco-friendly product. According to social cognitive theory or SCT, consumers learn and adopt eco-friendly purchasing behaviours by observing companies' green marketing practices and social cues (Dreyer *et al.* 2022). Hence, based on this theory, when sustainable packaging is consistently promoted as desirable and responsible, it influences consumers to imitate these behaviours and reinforce norms of environmentally conscious consumption (Dreyer *et al.* 2022). Thus, businesses foster sustainable habits, empowering consumers to align their choices with broader environmental responsibility goals. In constant, another factor that has traditionally been important in the sustainability agenda in India is the Corporate Social Responsibility or CSR. The Companies Act, 2013 requires companies to invest part of their profits in social and environmental projects (Indiacode.nic.in, 2025). This has been an opportunity that many corporations have taken to budget waste management systems, recycling plants, and afforestation programs. The latter extends to FMCG giants, online stores, and chains that pilot the organisation of take-back and funding of packaging waste collection nets and developing the system of sustainable consumption more convenient to consumers (Pal and Sandberg, 2024). Furthermore, shaping consumer aspirations by explicitly making sustainability a part of their business and marketing strategies helps businesses to make eco-friendly consumption a precondition of stylish, responsible living.

2.7.3 Collaboration among government bodies and business organisations to support the adoption of plastic alternatives in India

The most influential advancement to lessen the dependence on plastic is the involvement of the public-private partnerships or PPPs with private institutions (Espuny *et al.* 2025). There is an increase in the collaboration of the governmental bodies and business organisations aimed at the development of common infrastructure and policy frameworks that allow the adoption of alternatives. As an example, the Extended Producer

Responsibility or EPR regulations oblige industry players to accept responsibility when it comes to the end-of-life of their plastic packages (Kumar and Bhati, 2022). Similarly, a substantial number of companies, along with the help of municipal corporations, have established recycling centres, reverse vending machines and online monitoring systems which allow them to monitor their recycling compliance. Consequently, the viability of alternatives can be demonstrated by such collaborative pilot projects as eco-markets with cloth bags and refill stations where bulk household goods can be found. Delivery services and E-commerce websites, together with urban local bodies, are experimenting with the looping of returnable packaging (Gustafsson *et al.* 2021). These programs do more than simply provide structural provisions of substitutes; they also inform consumers about the sustainable option by bringing the sustainable option into view. Moreover, government-regulated industries do have industry associations like the Federation of Indian Chambers of Commerce & Industry or FICCI that mediate between the government regulators and the business (Ficci.in, 2025). Hence, their joint efforts result in policy-making that tries to be a balance between innovation, consumer, and environmental interests.

Overall, the government intervention in the form of bans, subsidies and awareness campaigns in India establishes the regulatory framework, whereas the business industry promotes the change of consumer behaviour using green marketing, CSR activities and special packaging products. Similarly, the cooperation with the two guarantees the avoidance of the need to use alternatives to plastics, but rather they should be practical, affordable, and appealing to consumers. In contrast, the integration of policy pressure, corporate responsibility, and collective innovation enables consumers to adopt a sustainable consumption pattern (Kumar *et al.* 2021). It also provides them with an incentive to collaborate with the government and business organisations to achieve the desired results in attaining the objective towards environmental sustainability in India.

2.8 Barriers for adoption of plastic alternatives in India

India has taken some steps to reduce the use of plastic and encourage its sustainable alternatives, but the mass adoption is low. There are four broad types of barriers to this shift, namely, economic, infrastructural, behavioural, and systemic.

2.8.1 Economic and market barriers

Plastics make an overwhelming presence in the Indian market due to the fact that they are affordable, light, and manufactured in large quantities. However, disposable packaging made of materials such as jute or glass is much more costly to produce and buy (Hira *et al.* 2022). There is also no production of economies, and only a small manufacturing capacity, which ends up making them more expensive. Hence, affordability is the determining factor among small vendors and low-income consumers who comprise a high proportion of the retail economy in India (Roy *et al.* 2021). There is also uncertainty among the producers with regard to securing the raw materials. This is because high costs, limited production and raw material uncertainties make plastic alternatives unaffordable, resisting adaptation among vendors and consumers. Hence, products made of paper or bagasse, such as an example of paper or bagasse-based products, are subject to seasonal agricultural products, so the supply chains are unstable and costly. Thus, in the prevailing mode, the economic viability of alternatives remains a challenge unless specific subsidies, tax benefits and investment in low-cost production on large scales prevail.

2.8.2 Infrastructure and waste management gaps

The ecological advantage of alternatives would be based on an appropriate waste management system, and this is not well developed in India. In accordance, biodegradable or compostable materials require an industrial composting or a biogas plant to decompose adequately, and such plants are not abundant across most areas (Sharma *et al.* 2024). Practically, green products would usually find their way to the landfill, where they would decay at the same rate as plastic (Wojnowska-Baryła *et al.* 2022). There also exist impediments against recyclable alternatives such as metals, glass or paper. This showcases

a poor implementation of waste segregation at source, and when items that can be reused are contaminated with organic waste, they are difficult to recover. This undermines any confidence of consumers and businesses in alternatives, as the environmental advantages obtained are seldom to the promised extent. Hence, effective waste collection, segregation, and processing mechanisms are a precondition to make a difference.

2.8.3 Consumer behaviour and social norms

The decisions made by consumers play an influential role in adoption, and awareness is poor. The fact that many simply have no knowledge of differences between biodegradable, compostable and recyclable products, and greenwashing claims create false perception and further undermine the trust (Allison *et al.* 2021). Plastics, however, are not new, easy to work with and socially deep-rooted. Consequently, disposable plastic cutlery in nature stations and festivals and single-use bags, or food packed in lightweight plastic containers have gained wide acceptance (Dybka-Stępień *et al.* 2021). Thus, alternatives cannot allow people to stick to their lifestyles as they require behaviour change, like the use of reusable bags, or returning refillable containers, which the majority of consumers find inconvenient due to their busy urban lifestyles. Thus, this showcases the behavioural resistance in the form of a significant barrier that is likely to continue without any prolonged awareness campaigns, incentives and nudges.

2.8.4 Policy, regulatory and sustainable challenges

India has implemented prohibitions against single-use plastics and also EPR laws with poor and uneven enforcement (Singh and Biswas, 2023). Accordingly, even in most places, prohibited goods are easily exploited, and uncertified eco-goods come to the market since the requirements are indistinct. That suppresses consumer credibility and corporate inclination to invest in substitutes. There are also environmental trade-offs. Moreover, the manufacture of paper on a large scale uses substantial amounts of both water and energy (Chen *et al.* 2021). Similarly, cotton bags have a high carbon and water footprint unless repeatedly reused, and glass containers are sturdy but require extensive energy during

transportation. Hence, such complexities make it hard to find real sustainable alternatives. Furthermore, policymakers and businesses thus do not know how to scale up adoption, given that there is no evidence-based alternative that is better than plastics long term.

Overall, four mutually reinforcing obstacles have hindered the switch of India to plastic alternatives, including economic boundaries, infrastructural deficiencies, customer opposition, and insufficient dependable designs and sustainability set-offs. Hence, to triumph over the challenges, it is necessary to act systemically. Governments should encourage affordability by imposing subsidies, incentives and by investing in large-scale waste processing infrastructure (Ezeudu and Bristow, 2025). Accordingly, enforcement of bans would be made stronger, eco-friendly products should be standardised, and greenwashing needs to be cracked down on once again to instill confidence. In addition, consumer education and nudging behaviour towards doing what is sustainable is equally important to normalise what is sustainable (Neumann *et al.* 2024). Moreover, innovation should focus more on scalable, cost-effective, and truly green initiatives. Based on these factors, only concerted effort by the policymakers, the business sector, and consumers would lead to the removal of these obstacles and transition to mainstream use of plastic alternatives in India.

2.9 Literature Gap

These comprehensive empirical studies have investigated the substitutes of plastics that can be practised in India, such as biodegradable plastic bags, bagasse packaging materials, areca leave products and usable containers. However, there are a number of gaps. In accordance, the existing studies focused greatly on the material specifications, life cycle analysis, and consumer attitude, but there is not enough on the long-term cost-effectiveness and feasibility of the alternatives within different socio-economic contexts. Consequently, even though awareness is increasing, the behavioural transition process of the consumer going from intention to consistent adoption is little-known, more so with low-income groups. In the same manner, data is also missing on the integrated system with waste infrastructure, producer responsibility, and consumer involvement at most points. In

addition, no empirical evidence is available on the combined effects of government regulations, government subsidies, and green marketing by corporations on sustainable consumption behaviour in India. Moreover, studies did not assess trade-offs simultaneously on environmental, economic, and cultural levels. Hence, this lack of certainty makes it impossible to know which choices provide holistic sustainability. Therefore, these knowledge gaps needed to be filled and pointed out to the necessity of a multidisciplinary, evidence-based approach to which helps to obtain a crucial understanding that further enhances environmentally sustainable consumption.

2.10 Theoretical framework

2.10.1 Theory of Planned Behaviour

The Theory of Planned Behaviour or TPB is a useful concept through which the question posed could be understood using the experiences and influences of Indian customers towards using plastic alternatives, especially biodegradable bags. Three main factors determine how a person acts, all of them identified with the help of TPB: attitudes, subjective norms, and general perception of the sense of behavioural control (Ashaduzzaman *et al.* 2022). Since the biodegradable bags are considered socially and environmentally desirable, they receive a positive opinion among many Indian customers. Subjective norms are also involved, as the individual often feels that government programs, what others prefer to use as environmentally friendly products, or even the expectations of people in the community, can influence him or her. Perceived behavioural control, though, shows the complexity or ease with which consumers perceive embracing these options to be. People are more confident in the usage of the biodegradable bags when they have them and when they are affordable. These factors are complementary and help to understand why adoption is not everywhere equal, but the willingness continues to grow, whereas real use remains primarily driven by availability, affordability, and awareness.

2.10.2 Diffusion of innovation theory

The theory of Diffusion of Innovation or DOI, is very pertinent in explaining the effect substitutes can play in ensuring producers and consumers are convinced to use environmentally friendly practices to facilitate the sustainability goals. The theory provides that adoption of new practices or products, like reusable packaging, compostable or permissible items or the recycled-content solutions, also uses a phased procedure which includes an innovator, early adopters, early majority, late majority and late adopters (Herbst and Barner, 2024). Similarly, when it comes to plastic substitutes, consumers and producers weigh relative advantages like economic benefits, less pollution, and compatibility with established ways to make it easier. Consequently, the issue of complexity does not take a back seat as well as trialability or outcome observability, such as waste reduction or an enhanced brand image. Hence, with these factors, businesses and policymakers can provide good environmental conditions for early adoption and encourage the rest of the society to adopt it in a friendly manner. An example is the ways innovators and early adopters using the reusable packaging models have influenced more consumer behaviours, because it has become normal to do sustainable activities (Ganglmair-Wooliscroft and Wooliscroft, 2022). Therefore, with the aid of the DOI theory, organisations can measure and hasten a shift with respect to substitutes that enhance pro-sustainability purposes through a systematic scope.

2.10.3 Consumer Decision-Making Model

The Consumer Decision-Making Model or CDM Model is very pertinent to study lifecycle assessment of plastics and their impact on the environment because it describes the process of deciding the ways consumers make different decisions at various levels of consumer decision-making (Roy and Datta, 2022). The recognition of the problem is in the stage where consumers realise the negative environmental effects on the end of life of plastics that are causing the pollution, microplastics and landfill overflow, resulting in concerns about the sustainability. Accordingly, consumers do more comparisons of plastic with their environmentally friendly alternatives, such as biodegradable packaging or paper and glass,

making life and short-term costs vs the long-term environmental drawbacks considerations (de Jong *et al.* 2025). Hence, brand and government regulations are pointed out in the communication concerning sustainability and perception to purchase the product. Moreover, during the post-purchase period, experiences that the consumer has with alternative products, like durability, cost, and ease of disposal, cement or deter future adoption. Hence, in this way, this model is useful in explaining the formation of consumer behaviour based on the knowledge of the effects of using plastic in its life cycle, which leads to the incremental shift towards more sustainable substitutes.

2.10.4 Social cognitive theory

Social Cognitive Theory or SCT, is equally important in describing the impact of green marketing and CSR programs on consumer behaviour to use alternatives to plastic. SCT places much emphasis on the presence of observational learning, where individuals learn to acquire new behaviours by observing models in their social and environmental setting (Dreyer *et al.* 2022). Accordingly, when corporations adopt CSR programs- like funding green projects, or pushing eco-friendly packs, or advertisements of commitment to the environment, they become models of green initiatives. These behaviours, in turn, are observed and embraced by the consumers as being socially acceptable and morally responsible. It is this observational learning process which helps to develop consumer tastes and also creates a sense of trust and strengthens the tendencies of highly ranked attitudes towards sustainable products (Dreyer *et al.* 2022). Hence, businesses that emphasise their commitment to the environment and reiterate this responsibility several times would normalise green consumption and prompt more people to use substitutes for plastic. Consequently, SCT makes it suitable to explain the effect of the corporate actions on changing consumer behaviour through collective social reinforcement and reinforcement of the sustainability aims.

2.11 Conceptual framework

A conceptual framework is a formalised description of concepts, variables and the ways they are to be related in the study of research. It is a guide that not only connects the theory and the practice but also assists the researcher in what to examine, the ways the variables relate and the importance of the research. Similarly, it is important because it defines clarity, focus, and direction, as the study can become coherent and logically structured and is aligned with the research objectives, and they are not ambiguous. In a similar manner, the conceptual framework of this research also significantly showcases the relationship between the relevant theories and the different crucial aspects that help to understand the ways Indian consumers perceive and utilise plastic and its alternative they have in the market. It also showcases the variables that are crucial to understanding Indian consumers' perspectives towards alternative plastic products. The understanding from this framework also significantly helps in identifying the effective methods that help in collecting crucial information and analysing it to obtain overall research outcomes.

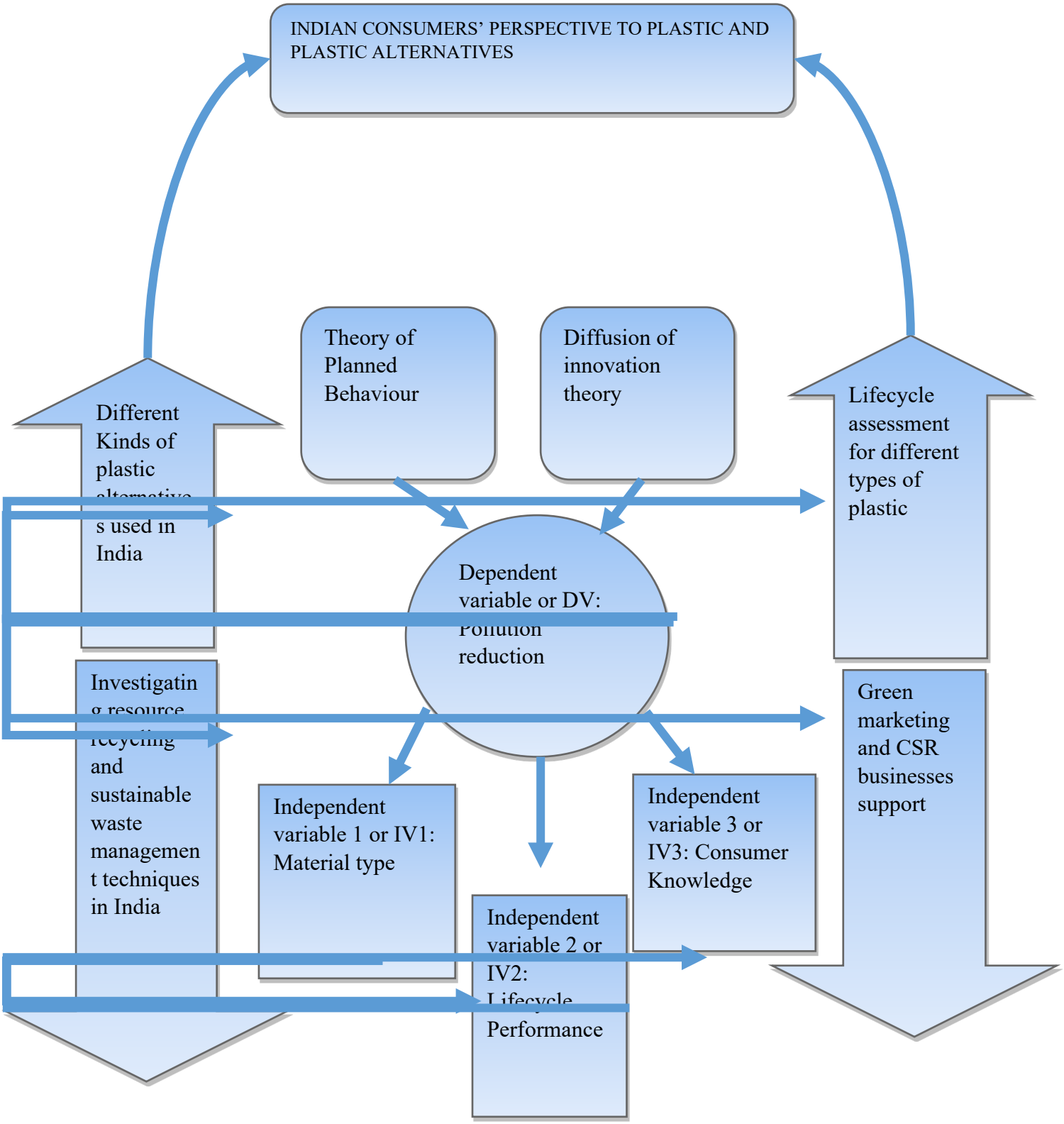
INDIAN CONSUMERS' PERSPECTIVE TO PLASTIC AND PLASTIC ALTERNATIVES
Theory of Planned Behaviour
Diffusion of innovation theory
Different Kinds of plastic alternatives used in India
Lifecycle assessment for different types of plastic
Dependent variable or DV: Pollution reduction
Investigating resource recycling and sustainable waste management techniques in India
Green marketing and CSR businesses support
Independent variable 1 or IV1: Material type
Independent variable 3 or IV3: Consumer Knowledge
Independent variable 2 or IV2: Lifecycle Performance

Figure 2.9: Conceptual framework

2.12 Summary

This chapter succinctly discusses several plastic alternatives that are utilised in India, such as compostable and biodegradable bags, reusable glass and metal containers, areca leaf goods, and bagasse packaging. The assessment of the lifetime of different plastics, including paper, glass, aluminium, and bioplastics, is also covered in this chapter. Additionally, this chapter illustrated how consumers view the benefits and drawbacks of using plastic alternatives, the overall environmental impact of plastic alternatives, the impact of plastic alternatives on India's sustainability and environmental pollution reduction, the influence of governmental and corporate entities on Indian consumer behaviour, and the barriers to the nation's adoption of plastic alternatives. This section also offered theoretical viewpoints, a literature gap, and a conceptual framework.

CHAPTER III:
METHODOLOGY

3.1 Introduction

The chapter details the methodology of how the opinions of the Indian customers are explored through the use of plastics and substitutes. In order to make it compatible with the objectives of the study, it gives details regarding the availability of the research approach, the "philosophy", "research design", "data collection", "sampling", "data analysis", and ethical issues. In the study of consumer attitudes, investigating an "exploratory design", a "pragmatic philosophy", and "inductive reasoning" helped to study a complex situation in social, cultural, and economic issues. The combination of the primary and secondary data in the study ensures that it is able to guarantee credibility, depth, and relevance in answering the research questions.

3.2 Research approach

"Research approaches" refer to methods and practices that encompass the overall hypothesis as well as particular methods of collecting, analysing, and interpreting data (De Oliveira, 2023). There are several decisions within this plan, and they do not need to be arranged in the order that makes sense to one individual or how it is written. The final decision is what approach to use when researching a topic. Such a choice should be influenced by the philosophical assumptions that the researcher may be doing the research. It is the outlining of a pattern or strategy that guides the formulation of research conducted, data collection, and conclusion. It provides the logical relationship between issues of the research and the methods of tackling those issues. Selecting the right method is a requisite in academic research, more so dissertation, since it ensures that the research is aligned with its objectives, the nature of data, and also regarding the issue being examined.

There are three generally accepted approaches: deductive, inductive, and abductive. Both have their reasons as to why they are used in various settings. The latter-mentioned deductive technique can also be known as a 'top-down approach. It carries the prevailing idea of work and then determines whether the theory is true or false in light of such a

situation. In a case study, a deductive researcher can draw some of the hypotheses on the basis that eco-friendly contact relates directly to consumer knowledge and apply the derived results (Kumar and Ujire, 2024). The qualitative approach to research, the design of the data collection, and hypothesis testing are associated with deductive research. The inductive technique, on the one hand, is a bottom-up approach. Instead of developing a hypothesis at the outset, the researcher accumulates as much data as possible, finds some patterns, and then comes up with a set of connections or hypotheses based on the data that has been obtained. The purpose is exploratory in nature and, therefore, themes might evolve on the part of the participants as well. It is particularly helpful to understand the attitude, behaviour, and opinion where prior knowledge or thoughts do not exist (Yuwono and Rachmawati, 2023). And in the last between the two, there remains the middle way, the abductive technique. It has been characterised endlessly as the procedure of intersubstituting theory and data (Van Hulst and Visser, 2025). By combining the deductive and inductive constituents, the abductive method employed in investigating or delving into the potential hypotheses commences with startling information or perplexing pieces of evidence. It has found application in fields of direct application where new phenomena can be resisted by the application of existing concepts.

The aim of the present study is to comprehend the relationship between attitude, perceptions, and behavioural patterns of human beings towards environmentally durable practices and products. It is not possible to have a one-size-fits-all theory to explain the perception of Indian consumers on plastics versus alternatives so far as they are socially constructed attitudes and context-specific. The situation can best be accommodated with the inductive approach. Rather than prove an a priori hypothesis, the primary objective of the current study is to explore and uncover customer insights. Taking into account cultural, social, and economic backgrounds, Indian consumers have different views in regard to the use of plastic materials and their alternatives. According to Haque (2022), induction is reasonable since the purpose of the investigation is to discover these opinions and not to confirm a previous hypothesis. The scholar does not directly apply the generic or Western ideas of consumer behaviour but collects primary data of the Indian customer. New

conceptual knowledge of Indian consumer behaviour might also be established in terms of this area, researching these findings and following the patterns and the theme. It is this group-up building of knowledge that is the characteristic feature of the inductive approach.

3.3 Research philosophy

The basic philosophy of beliefs, which moulds the way that a person views the world, and what they choose to do with it as a researcher, is what is referred to as their "research philosophy". The assumptions and ideas that guide the formulation, understanding, and use of information in research are known as "research philosophy" (Mbanaso *et al.* 2023). Briefly, it affects the marginal phenomena of the researcher, such as his ontological perspective, epistemological approach to obtain information, and axiological ideals. Choosing a philosophy of research is essential since it ensures that the methods utilized in terms of gathering and analyzing the data supplement the general purpose of the study. Each researcher has to decide the kind of information they want, the most practical method to collect it, and are willing to make about the reality. Essentially, there are ways in which philosophies react to these questions.

Philosophies are mainly of four kinds that is, positivism, interpretivism, pragmatism, and realism. Positivism was based on the belief in quantified and objective reality. Quantitative methods such as surveys and experiments are of great importance to this type of thought (Ikram and Kenayathulla, 2022). Quite often, the reason is to examine theories and present the results that can be applied on a broad basis. A positivist, say, will turn to statistical models to gauge aspects such as price sensitivity or degree of awareness as a way of exploring consumer behaviour towards plastics. The object of interpretivism, on the other hand, is to understand lived experiences and subjective meanings of people. It is grounded on the premise that reality is socially constructed, and in order to understand it, one has to study the way people interpret it. Such qualitative methods as focus groups and interviews are common in this philosophy. In the middle of positivism and interpretivism is realism. It is accepted that there may be a reality before human perception takes place, but social and cultural environments always affect the way people perceive this reality (Lawani,

2021). Realists accept not only objective facts but subjective interpretations as well, and have a tendency to combine both qualitative and quantitative methods. Finally, pragmatics does not support the idea that one philosophical stance is superior to another. Instead, it advises on the use of any strategy or technique that will help the most in solving the topic of research. The pragmatics can rely on both objective and subjective perceptions, both primary and secondary data, as it is a flexible approach because it also relies upon both qualitative and quantitative methods. It is not the mission to follow thoroughly a particular type of philosophy even but the mission would be to resolve problems and generate thoughtful ideas.

The current study focuses on consumer behaviour and consumers' thought processes in a complex social, cultural, and economic environment. To a greater extent, pragmatism provides the most logical and applicable background to the study as it integrates both primary and secondary evidence (Elgeddawy and Abouraia, 2024). A researcher can incorporate several procedures of data collection due to the existence of pragmatism. Although secondary data, including publications, policies, and previous research, offer a more general structure, primary data in terms of surveys of Indian consumers provides first-hand information about consumer behaviour. Pragmatics claims that both are good and complementary. The way that consumers feel about plastics cannot be understood through more than a numerical approach. Whereas statistical results may show the number of customers who prefer substitutes, qualitative knowledge gives a justification for why they are using this method. Pragmatics understands the importance of subjective interpretation as well as the use of objective measurement. It is this balance that enhances the overall results.

3.4 Research design

The systematic outline or blueprint that explains how a research is going to be conducted is referred to as the "research design". It helps that the study goals are covered systematically when it offers various guidelines on the collection, analysis, and interpretation of data (Salter, 2023). "Research design", the simple way of putting it is the

"how" of a study, how will data be gathered, how will evidence be analysed, and how conclusions will be drawn. Linking the main research topic with the research philosophy, technique, and methodologies brings a sense of focus and clarity to a well-designed study. The designs differ in the sense that their roles also vary depending on the intended purpose of the research, describing/explaining, or investigating a phenomenon.

Designs are of two general types. According to Ellis and Hart (2023), the purpose of studying a phenomenon is the aim of providing a detailed description of a phenomenon as found, which implies using the descriptive design. It focuses on an explanation of what is happening, and it does not necessarily have to look into the issue behind that. An example of descriptive research on the use of plastics may be the recording of demographic trends in plastic utilization or the percentage of Indian-based customers utilising biodegradable bags. Despite the informative nature of this design, causes and reasons are ignored. One step further, "explanatory design" is aimed at demonstrating causality. It answers how and why of things. An example of the question that can be addressed by explanatory research is whether the purchase of plastic surrogates by customers depends directly on the level of income or environmental awareness. This design is often related to organised quantitative studies and statistical hypotheses (Toyon, 2021). Finally, an exploratory design is employed as a last design, in a case when a problem is new, or little researched, or vague. It is not intended to provide certain answers but to determine trends, insights, and places to continue the research. It is non-directive and flexible, and it places quite a substantial focus on qualitative information, as often supported by secondary data. The design accomplishes this by asking general questions and letting the findings lead the study rather than predetermining it, in essence, helping researchers to arrive at a sense-making outcome of complex, poorly understood issues.

As the issue facing the research is a socially complex one that has not yet been clearly defined in the Indian setting, an exploratory research design is the most appropriate design for the research. The research was registered in a descriptive design to reflect what is going on and not to test solid existing assumptions or hypotheses, which suggests an explanatory

design. In this regard, these two designs have been seen as disqualified in the study. Since it helps to approach the topic with an open mind, gather new concepts based on the primary data, and refine them with secondary data, such as reports and past studies, the exploratory design has been selected (Olawale *et al.* 2023). The current study seeks to find out the thoughts of consumers towards plastics, what they think of alternatives, rather than how much they consume them. Attitudes, beliefs, and perceptions are subjective and unpredictable, thus requiring the flexibility of a design in order to capture these complexities, and as such, an exploratory design provides such needed flexibility. An exploratory approach can use both primary data, such as focus groups, surveys, or interviews, and secondary data, such as policies, previous research, and reports (Haile, 2023). The mix guarantees greater insights since one is able to look at the problem in numerous ways. The current study is not set to provide clear regulations of consumer behaviour because it tries to determine the issue that should be further studied and represented in a policy. Exploratory design insights may then be tested in more formal explanatory or descriptive studies.

3.5 Data collection

Contacting information, evidence, and knowledge that helps in answering research questions of a study is termed “research data collection”. In other words, it entails the identification of suitable information sources that can help a researcher to perceive the issues under examination, regardless of whether these sources are already existing records or the information that is received on a first-hand basis (Mazhar *et al.* 2021). Unless gathering of data gathering is conducted, the study may be more of speculation than evidence. It is the heart of research, and not a simple mechanical practice. The relevance, faithfulness, and credibility are ensured through the selection of the data. The method of “data collection” also determines the reliability of the results and the extent to which they are pertinent in real-life scenarios. “Data collection” is necessary in many ways in research. It provides sustainability to the findings because it makes the study very grounded in facts and not on supposition (Mwita, 2022). The primary importance of data is making the voice

of people heard in the case of social research, as well as giving an insight into their attitudes, behaviours, and perceptions (Taherdoost, 2021). Information also makes sure that suggestions indeed refer to the real problems under investigation and are not only hypothetical.

The "data collection" takes two main forms, namely, primary and secondary. The first-time entry of information by the researcher is called the primary data (Ajayi, 2023). Included in this are surveys, interviews, focus groups, experiments, and observations. The major advantage of it is that it reflects the present time and is specific to the study topic. Examples of primary data that are being collected are original and related to the current study when one interviews Indian consumers on their views about biodegradable packaging. On the one hand, the piece of information that has already been collected by other people and that is just waiting to be used is called "secondary data" (Johnson and Sylvia, 2023). A few examples are Government studies, industry survey papers, journal articles, market research publications, and policy documents. Since it allows comparison, provides context, and helps to supplement key findings, secondary data is useful. By analysing Indian government reports on plastic waste, one can put their findings of consumer-level analysis in a new context of the country in general.

In the present dissertation, both secondary data collection and primary data collection were used. It is essential to communicate with the Indian clients directly, as the given study is about opinions. With primary data, one can learn about the struggles, motivations, and experiences of the people through surveys or interviews (Nieuwenhuijs *et al.* 2022). Such first-hand reports make the study grounded and real. It is significant to take the consumer views into perspective without overlooking the other underlying issues of the environment, social, and policy. Secondary data widens the scope of the study and contextualizes the personal perspectives inside the framework of the broader trends, including government documents about how to handle plastic waste or global research on the topic of sustainable solutions (Dale *et al.* 2025). Whereas secondary data would ensure that one is building on the already known, primary data can help one to come up with new information, especially

as regards the Indian scenario. Together, they prevent specialization and generalization of the study. In order to collect primary data, this research focused on surveying 200 participants, and to gather secondary data, this study paid attention to peer-reviewed journals. The combination of both kinds of data makes triangulation, or cross-checking of results of sources, possible. Secondary information used, such as price comparison of plastics and the alternatives, as an example, could either prove or disprove consumer allegations that pricing is the biggest deterrent in the adoption of alternatives. This will increase the dependability of the research. Blending of bottom-up views with more general data is more helpful to policy makers, corporations, and environmental organizations. Both types of data allow the generation of both actionable and academically meaningful insights in the present study. The primary data would only be able to capture consumer views, and it would not be contextual. The findings may be limited or puny in the event that what the perspectives of the different lenses entail in regard to national directions or international studies is not known. According to Oranga (2025), the secondary data would be capable of offering a context, but not an accurate, real-time display of the two sentiments of the Indian customers. Consequently, the study would no longer be a research on exploration but on description.

3.6 Sampling Technique

A sampling methodology is simply the process of selecting of sample of a population to participate in some form of research. Systematic samples are used by the researchers because it is often not always possible to study all individuals who are part of a community due to time, financial, and accessibility constraints (Rahman, 2023). Considerable conclusions about the whole population can be drawn based on a well-chosen sample. Saving resources and time, one could have valid information when dealing with a limited number of individuals rather than thousands of them. A well-selected example increases the validity of the results and reduces bias. In case the methodology is appropriate, the results obtained in the sample can be projected onto the whole population.

Sampling methods can be categorized into two general types that include: probability and non-probability sampling, which include such approaches as simple random sampling, stratified, systematic, and cluster sampling under the former and convenience, purposive sampling, snowball sampling, and quota sampling under the latter (Van Haute, 2021). The research applied the concept of simple random sampling to garner 200 employees in the primary data collection. This is the most appropriate mode of doing so in several ways. With the help of SRS, all the members of the target population stand an equal probability of being selected. This enhances the fairness of the sample and minimizes selection bias, which makes the results reliable (Noor *et al.* 2022). Since the study is focused on the consumer perception, it is important to ensure that the sample is varied in its scope of thought without inclination towards any specific group of people. It is simpler to better cover the variety of Indian customers with the help of random selection. The method is easy to explain or apply when writing an academic text. This openness makes the results of the current research more credible. Furthermore, the knowledge gathered as a result of a survey with 200 people can be more reliably generalised to the whole group of customers, as this method of sampling minimizes the chances of bias. This is especially so when the research in question is directed at illuminating both academia and politics. Stratified sampling would mean that customers were divided in terms of education, geography, or even income. However, stratification was not even necessary since the purpose of this study is exploratory instead of inferential/comparative (Makwana *et al.* 2023). On the same note, the outcomes may be biased through systematic sampling, which risks splashing out a concealed trend. In addition, plaster sampling was unnecessary, even under very large-scale investigations, which were not required in the case. That is why the current study initiated a “simple random sampling technique” in the course of the investigation.

3.7 Data analysis

Data analysis refers to the process of systematically examining, organising, and interpreting information with the aim of recognising meaningful patterns, relationships, and meaning. It turns raw data, in words, statistics, or observations, into information that

directly points to the research objectives (Taherdoost, 2022). The data would just be a mass of incoherent information without meaning unless one analyzes it. Interpreting what the data says is the point of data analysis, which is more than just math or word coding. Analysis in the academic studies links findings with earlier information, makes links between evidence and theory, and gives plausibility to conclusions. It derives meaning from the data left unprocessed and allows the researchers to develop organised insights in reports, interview transcripts, and survey data. Common themes or unseen connections can be discovered using the technique of data analysis. Analysis provides credible data that can be adopted as a guiding tool by communities, corporations, and legislators (Aguas, 2022). Moreover, a minimal bias and dependability of results are achieved with systematic analysis. Analysis was a value addition to the study in future research and practice by correlating data with research issues.

Data analysis can be classified into two main forms: quantitative and qualitative. Quantitative data analysis is needed to analyse numerical data. Some of the methods include inferential, such as correlation, regression, and hypothesis testing, and descriptive, such as mean, percentage, and frequency (Sardana *et al.* 2023). With the help of quantitative analysis, measurable patterns, relationships, or differences are discoverable. Conversely, non-numerical data encompassing observations, open-ended survey questions, and interviews are subject to qualitative analysis. It extensively relies on thematic analysis, narrative interpretation, and coding. Qualitative analysis considers the emotions, perceptions, and cultural aspects to figure out the background of actions, which is why (Salah *et al.* 2021). As an example, examining the cause of reluctance to use biodegradable bags among the customers despite all of them being aware of the issues pertaining to the environment. The present research utilised both primary quantitative and secondary qualitative analyses. In order to gather quantitative data, it focuses on descriptive statistics, and in an effort to gather qualitative information, it paid attention to thematic analysis, where themes were derived from a systematic literature review.

Through quantitative analysis, it is possible to evaluate the behaviours, preferences, and demographics of customers among the 319 participants. It offers concrete figures, including the percentage of clients who would prefer using dirty plastics or the proportion of people who will be happy to spend more on biodegradable materials. These quantifiable insights make findings accurate and have broad application (Chalmers and Cowdell, 2021). The behaviour of the consumer cannot be described using figures alone. On the contrary, customer voices will be placed in the space of qualitative analysis. The peer-reviewed journals can be used to research issues with pricing, ignorance, or cultural practices that might affect decisions. This provides a greater depth and importance to the statistical results. The combination of two analyses creates both scholarly and useful results, which are generated through the study.

3.8 Ethical consideration

Ethical concerns are of the moral precepts and professional norms governing the planning, conducting, and reporting of research. The assurance that data will be handled properly and fairly, conclusions drawn in sincerity, and participants respected. Good ethics secure the integrity of the research, as well as the dignity of the participants (Nii Laryeafio and Ogbewe, 2023). Since the current research also involves secondary qualitative materials along with primary quantitative data obtained on the participants, it is particularly important to consider ethical concerns. Primary data collection requires informed permission, which ensures that participants understand the aim of the research and that involvement in the research is not compulsory. Anonymity and secrecy should be upheld to make sure that there is no revelation of personal information. In order to ensure the safety of data, its exclusive use to achieve an academic outcome, and its destruction at the end of the project, it is also necessary to observe the provisions of the “General Data Protection Regulation (GDPR)” (Vlahou *et al.* 2021). Through this, confidence is boosted among the participants, and the personal information is not used in fraud. In the case of secondary data, ethical responsibility includes expressing and not plagiarizing any material and referencing. Fear and clear analysis also make it reliable.

3.9 Summary

In its effort to uncover the sentiments of Indian customers toward plastic and its sustainable alternatives, the conducted research is inductive, exploratory, and pragmatic in its methodical procedure. Insights on the triangulation basis are built on the basis of secondary resources and inferences made utilizing the primary data gleaned from 200 randomly selected individuals. To measure both the subjective perception and the statistical trends, the two types of studies, quantitative and qualitative work together. Ethical concerns are also important in guaranteeing academic integrity, informed consent, and protection of the participant.

CHAPTER IV:
RESULTS

4.1 Introduction-

Chapter 4 provides the findings of the primary survey and secondary information analysis of Indian consumer perceptions towards plastics and their substitutes. It looks at levels of awareness, attitudes and behavioural patterns throughout demographics, the factors that influence these include cost, convenience, environmental concern and others. The chapter also explains how the socio-economic conditions determine the level of acceptance of substitutes such as biodegradable bags, areca leaf products, and reusable containers. This chapter presents a clear picture of consumer behaviour towards plastic substitutes in India as it compares the results derived with pre-existing literature and theories.

4.2 Quantitative data results (Descriptive Statistics)-

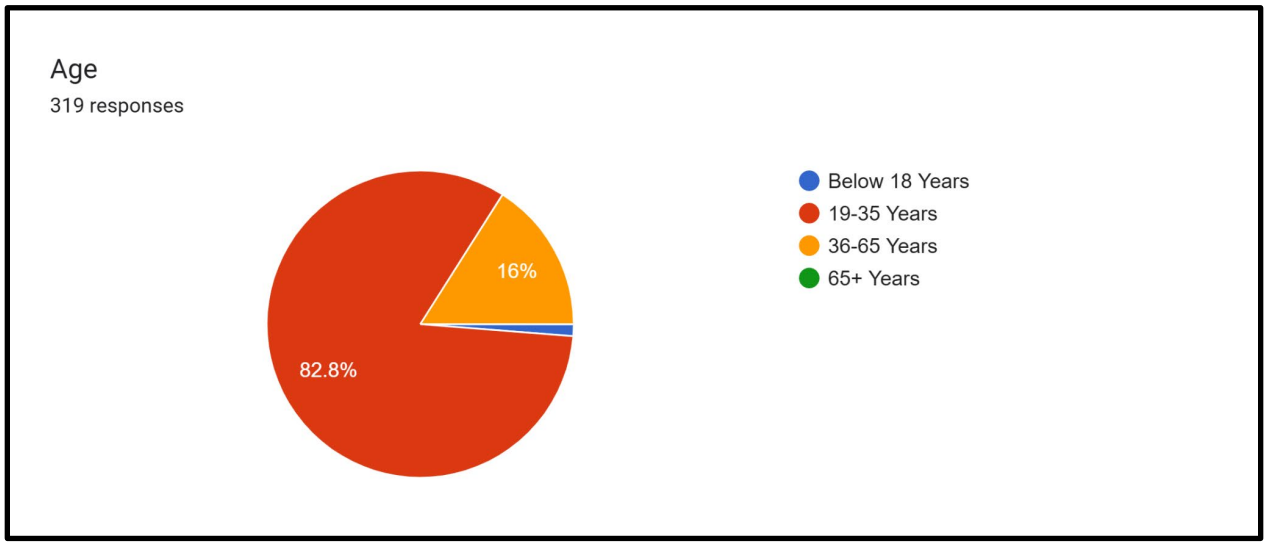

Figure 4.1: Age

The age profile draws attention to a large youthful sample, i.e., 82.8% aged between 19 and 35 years. Thus, 16% come under 18 years, and others are middle-aged (0.3%) or older and thus statistically negligible as representing the younger consumer.

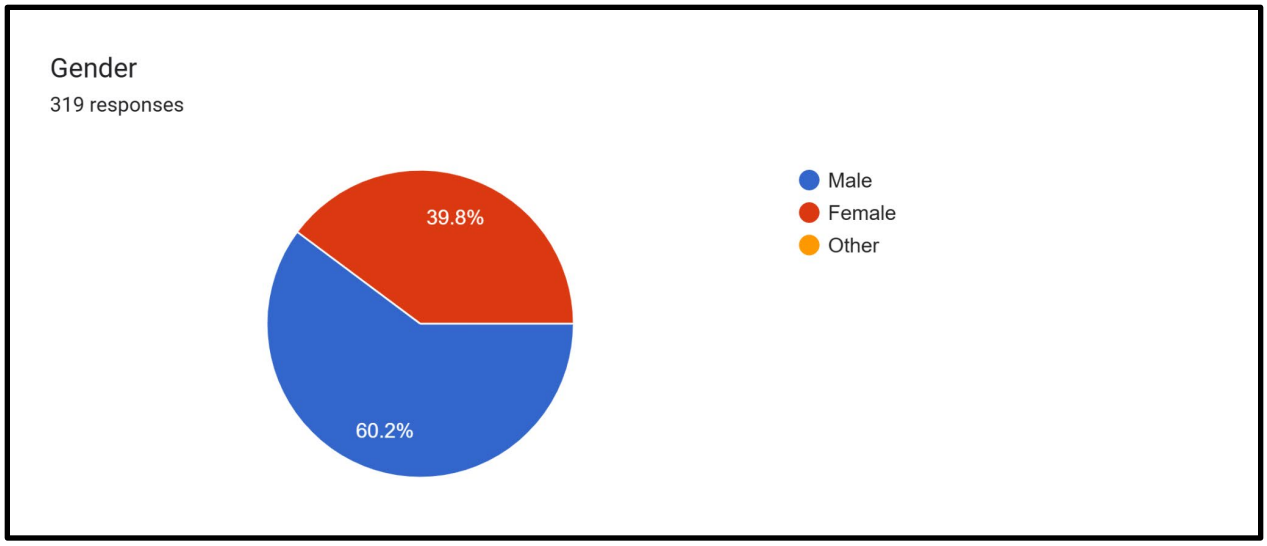

Figure 4.2: Gender

A breakdown of gender shows that the males are in the majority of 60.2% as compared to the 39.8% representation by the females, with other genders recording the driest of figures. This indicates somewhat unequal participation, but both genders' perspectives play a tremendous role in the analysis of consumers.

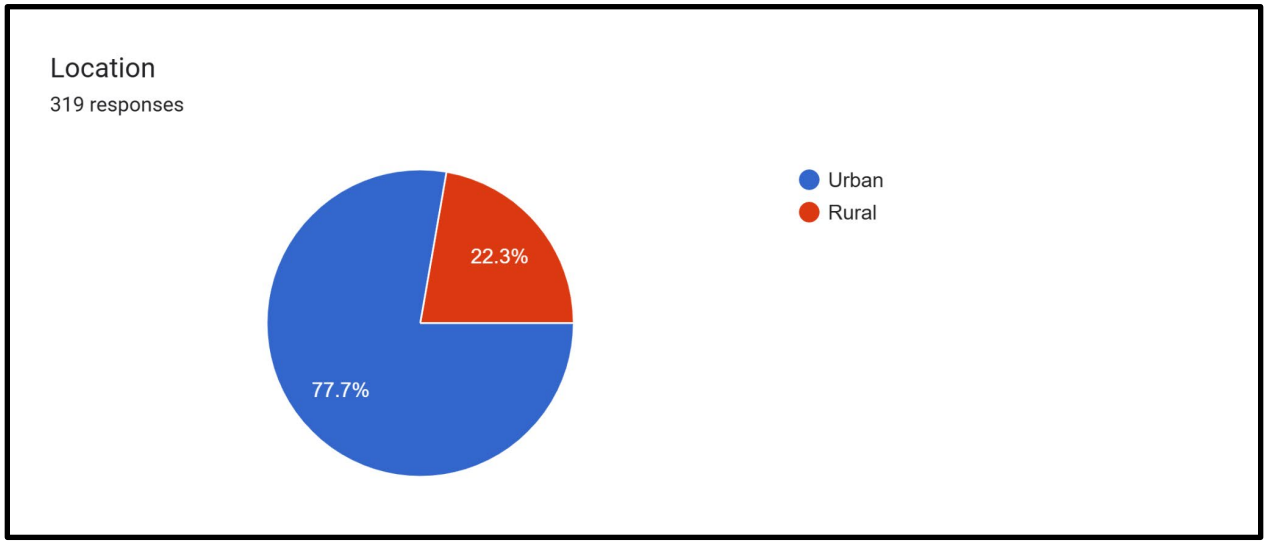

Figure 4.3: Location

The high number of respondents live in the town, which is 77.7%, whereas in the country, there are 22.3% of participants. This indicates the higher availability and knowledge of urban consumers, which directs the inquiries to urban behaviour and consumption patterns.

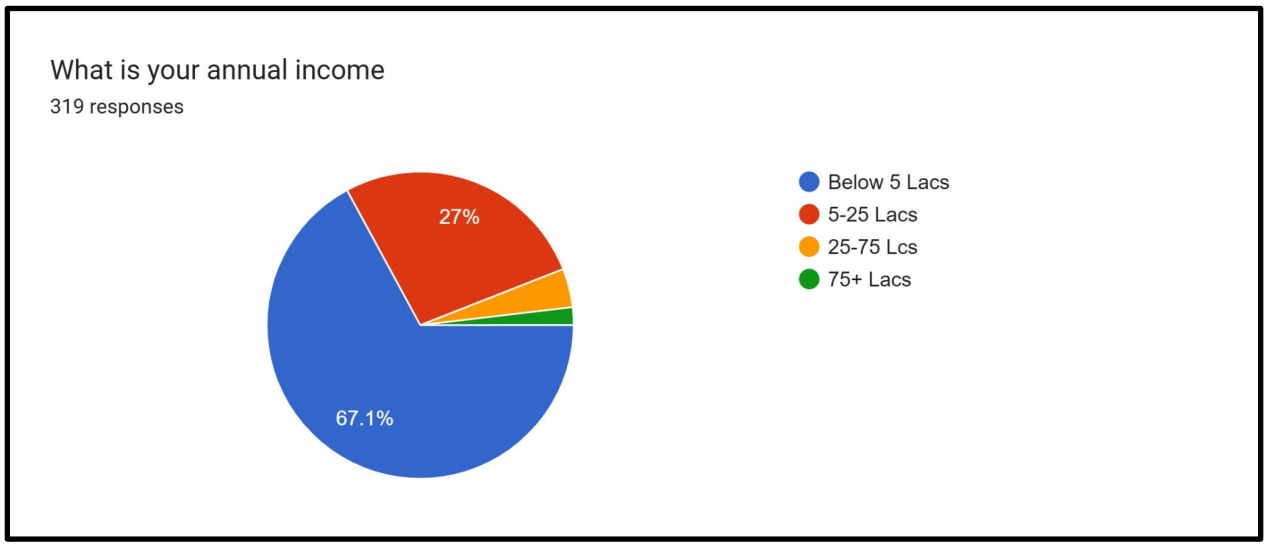

Figure 4.4: Annual Income

Income distribution shows that 67.1% of respondents receive less than 5 lakhs per year, 27% range between 5 and 25 lakhs. Four point 1% and 1.9% are in higher-income categories, which also shows a heavy middle-to-lower-income mix.

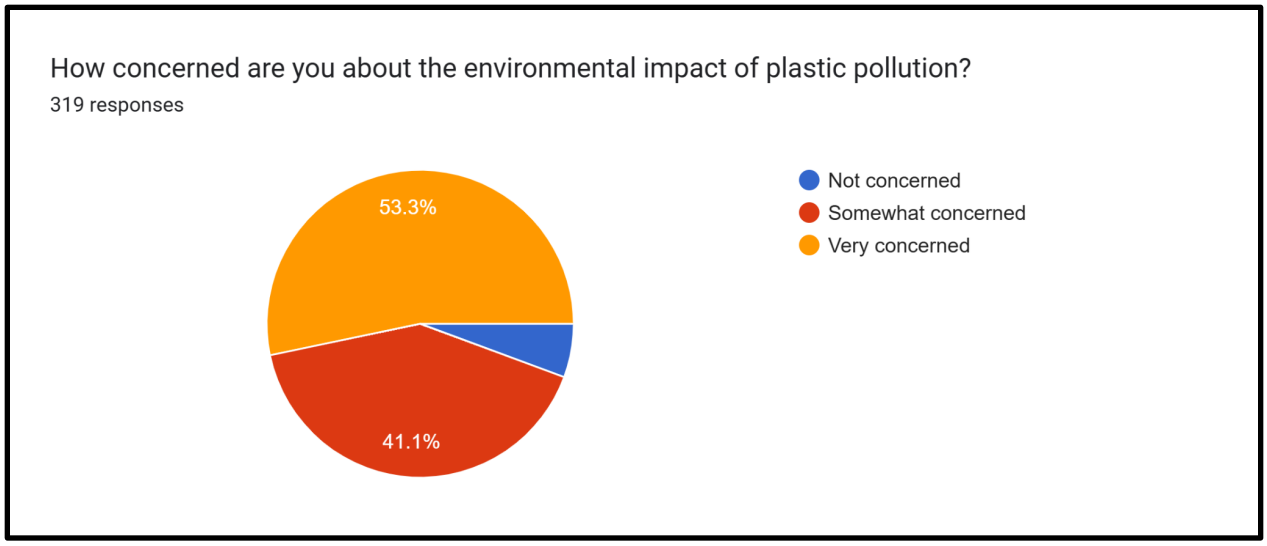

Figure 4.5: Plastics pollution as a problem in India

Strong environmental awareness is found in the fact that 95.3% of those who responded view plastic pollution as an issue of concern in India. Fewer than 2 in 100 (1.6%) disagreed, and 3.1% were uncertain. It suggests both the agreement and urgency among people to address the plastic-related problems in the country.

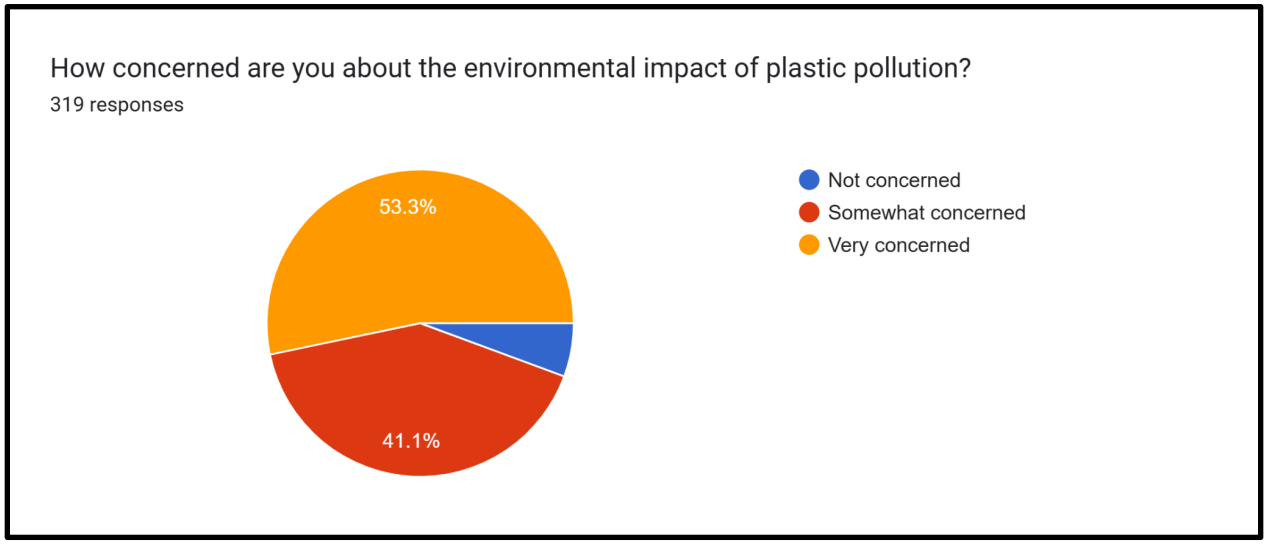

Figure 4.6: Concerned about the environmental impact

Over half of respondents (53.3%) are very concerned, and 41.1% are somewhat concerned, meaning that people are greatly worried. Less than one in twenty, 5.6%, are not concerned, which demonstrates that people are very sensitive to environmental protection and that it can affect the acceptance of sustainable products.

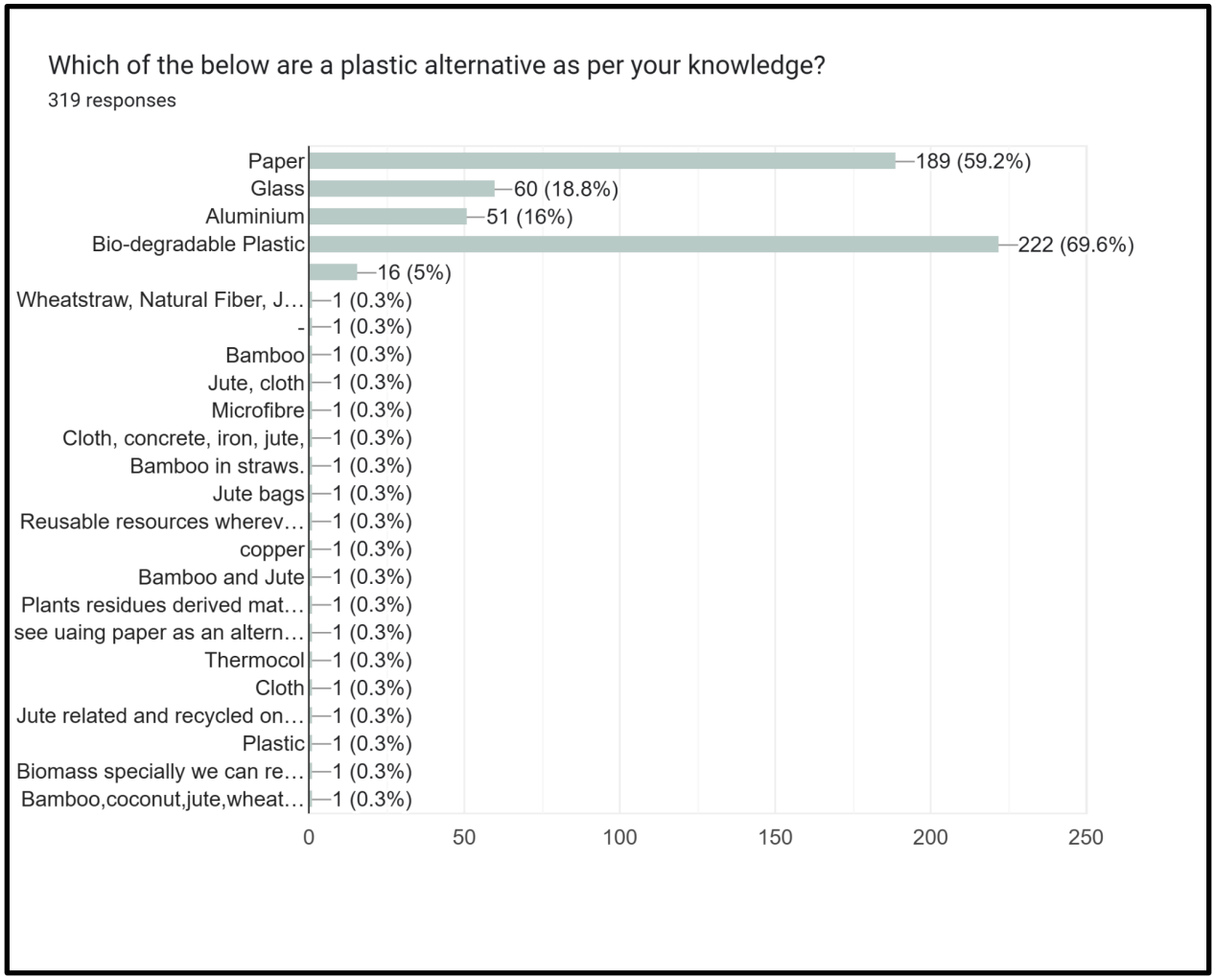

Figure 4.7: Plastic alternative

Different levels of awareness were depicted by the respondents with biodegradable plastics (69.6%) and glass (59.2%) leading, and aluminium (18.8%) lagging behind. The mention

of bamboo, jute or fibres is evidence of disunity in knowledge. The awareness campaigns can enhance awareness with regard to alternative materials besides paper or glass.

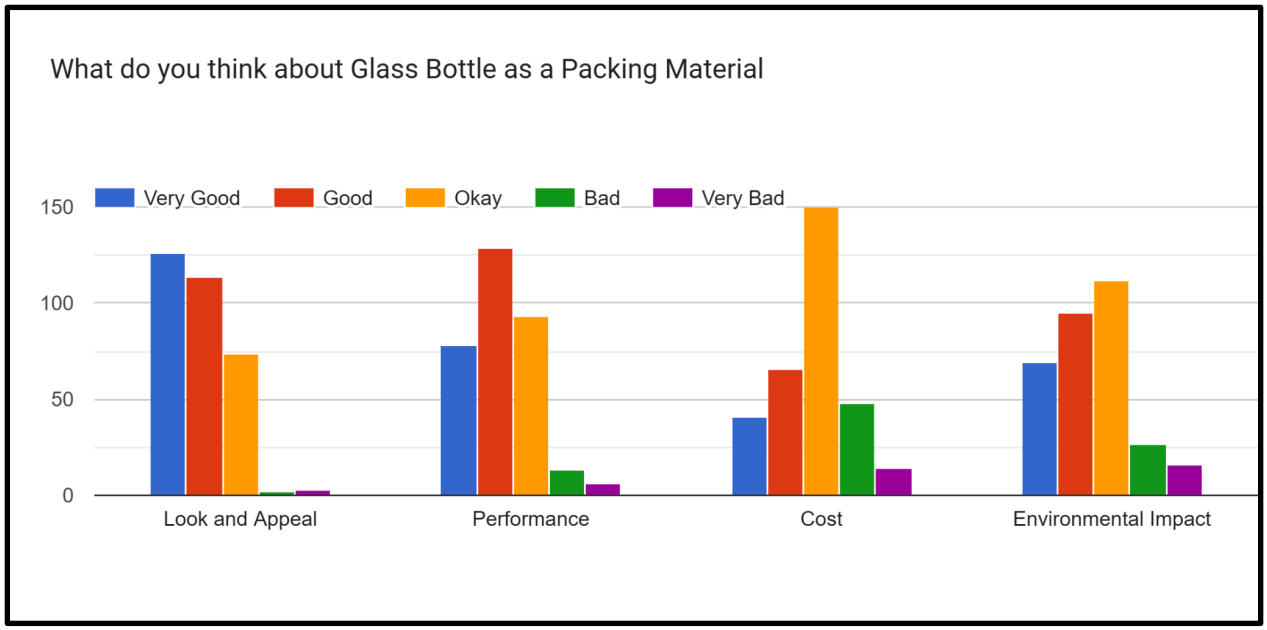

Figure 4.8: Glass Bottle as a Packing Material

Most participants evaluated glass in positive terms, with 126 judging it to be very good and 114 good, and only five rating it bad or worse. This means that there is a high level of consumer appreciation for the aesthetics of glass; it can work to the advantage of premium products being marketed based on aesthetics.

Performance reviews have been divided such with 202 respondents ranking them positively and 112 found them to be okay. There were only 19 who gave it as poor. This indicates that glass is quite good yet not always reliably good in terms of convenience, durability and handling.

The major disadvantage of glass bottles is cost. One hundred and fifty respondents thought it was okay, and 89 contributed to thoughts of it being bad or very bad. Only 107 found it constructive. Aesthetics place it in a better position, although affordability becomes an obstacle to large-scale adoption.

A hybrid perception appeared, which defines 164, 112 were positive, 62 were neutral, and 62 were negative. Recycling of glass is possible, but the need to use a lot of energy and product fragility might be the reasons why it is not used as a material as much as before. Consumers find themselves at a crossroads between sustainability advantage and production disadvantage.

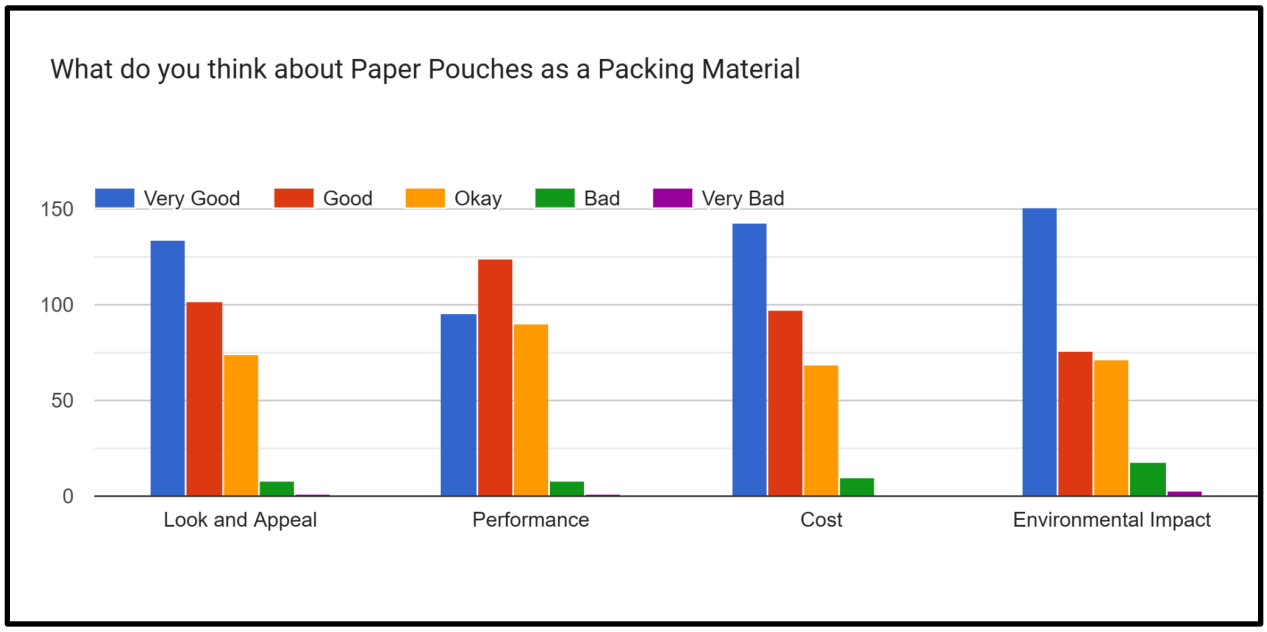

Figure 4.9: Paper Pouches as a Packing Material

Paper pouches got the highest affirmative response: 236 examined positively to paper pouches, whereas eight of them rated them negatively. There were 74 neutral reactions, which means that they can be used across the board as far as it concerns acceptability regarding the use of paper as a visually appealing material, which weighs lightly on the environment.

Performance was rated positively by the majority of participant respondents (220 combined), but 90 were neutral. Only eight respondents stated was below the rating. This indicates that paper pouches are reliable when it comes to performance, but pose a challenge for products that need durability or moisture readiness.

The price of paper pouches is an advantage. They also got high marks on-151 rated it as very good, and another 76 rated it as good. Nonetheless, 54 participants reproached the prices. In general, paper is an affordable and eco-friendly product that may be followed by both businesses and customers.

The largest number of respondents gave a positive mark to the environmental impact of 201. However, 99 graded it merely okay, and 19 were negative. This can only indicate an understanding that paper involves the cutting of trees, but it is still seen, in general, as greener than plastic.

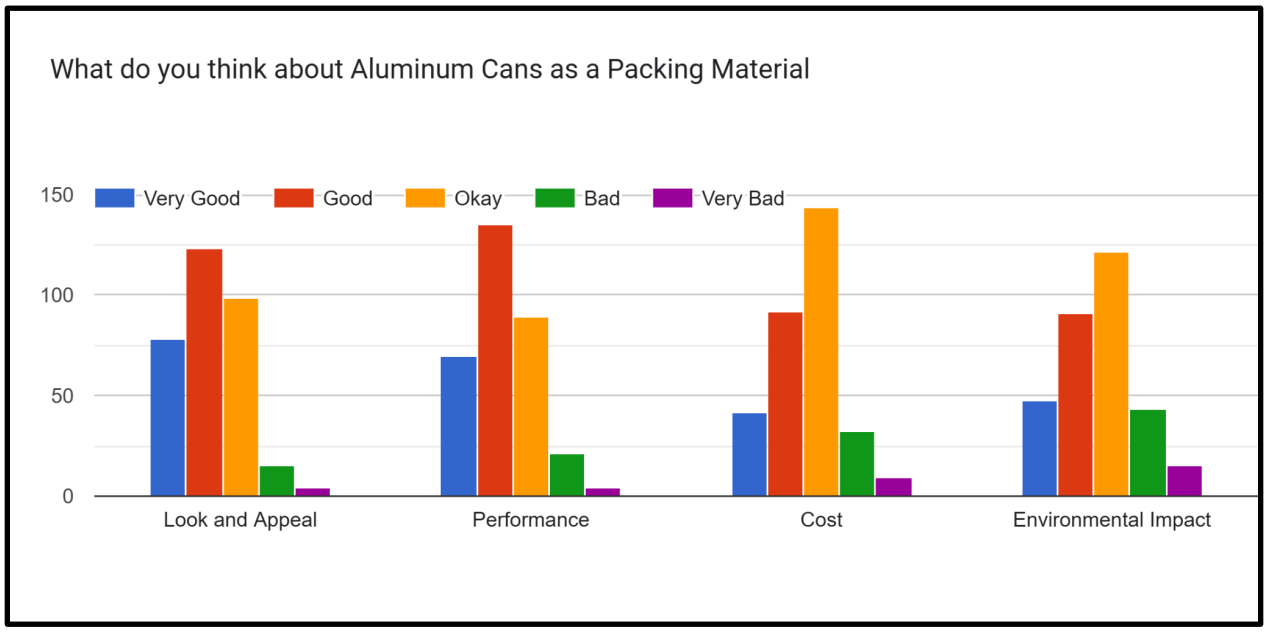

Figure 4.10: Aluminium Cans as a Packing Material

Aluminium cans ranked as visually good in judgments of 205 participants, 89 of them were neutral, and 25 were negative. This demonstrates that their sleek-modern look is very popular, especially for beverages, which boosts the brand image in competitive consumer markets.

Responses were on the neutral side, with 144 respondents replying okay in the performance rating. There are mixed views exhibited by positive ratings of 134 and negative ratings of

41. Aluminium has the advantage of durability and can be challenged on resealability and the convenience of use daily compared with plastics.

Cost is also a weak factor since 139 participants considered it positive, and 137 were singular or negative. Recyclability advantage is premature by the increased cost of aluminium. Consumers seem to be cautious in availing environmental advantages due to affordability.

The performance of the company in terms of the environment emerged as the best since 242 individuals rated it as very good and good, with only eight as bad. There is a lot of perception of aluminium because it is highly recyclable, though there are concerns about mining and energy consumption. It continues to be a firm eco-alternative.

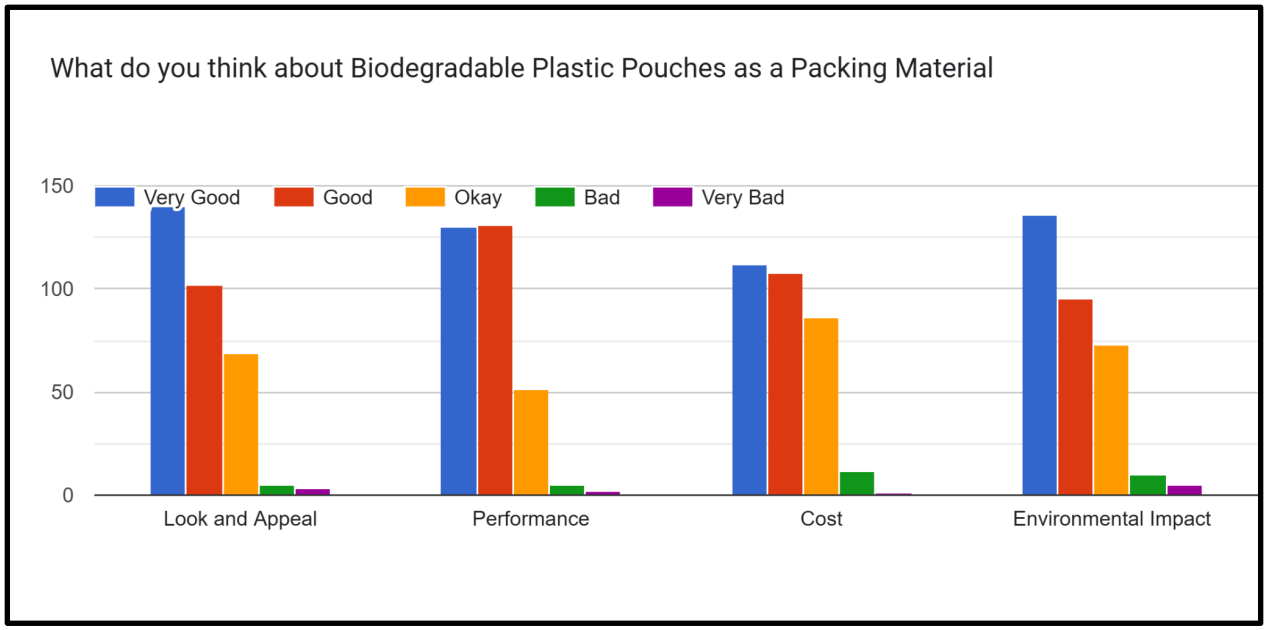

Figure 4.11: Biodegradable Plastic Pouches as a Packing Material

It can be stated that biodegradable plastics are generally highly accepted visually, as per 140 respondents, owing to their appearance similar to conventional plastics. 102 people said it is good, 69 were neutral, and 8 people shared a negative view. The true adoption is mentioned in the price and the feasibility of the product.

Most still responded positively to the performance (261), whereas 51 were neutral and only seven were negative. The evidence indicates that consumers are sure of biodegradable plastics as functional, which creates a great possibility of changing traditional plastic to these forms that have been scaled at reasonable prices.

The aspect of Cost was rated positively by 220 respondents, with 86 of them neutral and 12 negative. This indicates that the perspective of biodegradable plastics is that of a similar price with variation in product type and affordability on a mass basis adoption.

The perceptions were all favourable, with 231 rating environmental impact positively and only 15 rating it negatively. The consumers place their hopes on the attainment of the elimination of pollution through biodegradability, but the limitation posed by the industrial composting and the waste management process may have a bearing on the actual effects. This and further strengthening of this perception can be found in the awareness campaign.s

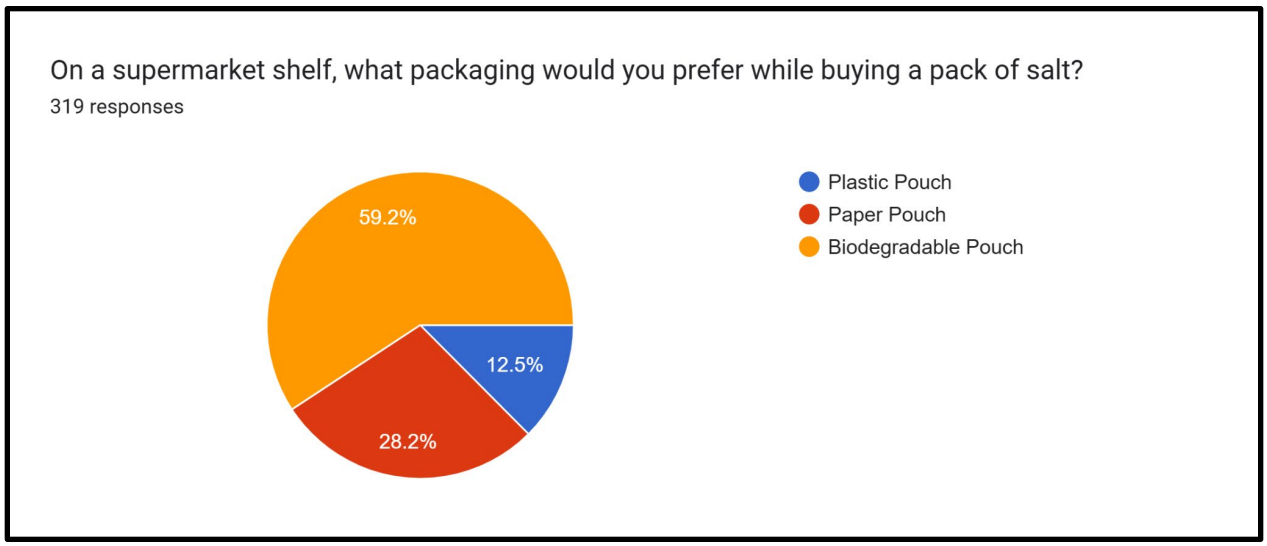

Figure 4.12: Packaging Preference for Salt

Biodegradable pouches held the most popular ranking (59.2%), with paper (28.2%) and plastic (12.5%) ranking second and third, respectively. This depicts the willingness of consumers towards environmentally friendlier packaging in common consumption

products, and the great acceptance towards biodegradables due to their property, making it highly market-friendly in FMCG products.

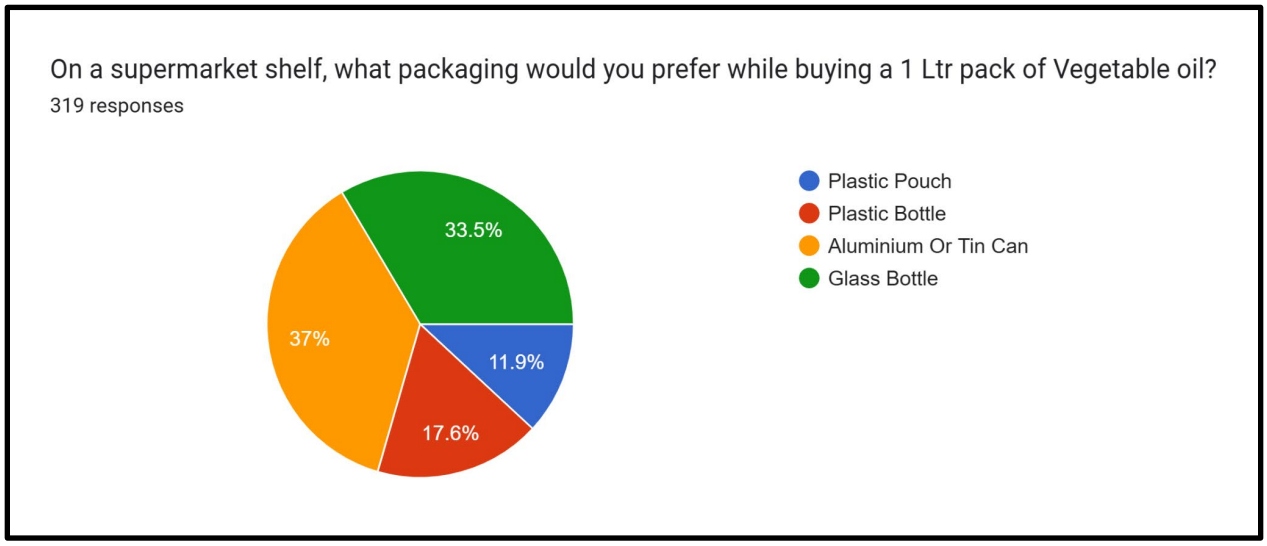

Figure 4.13: Packaging Preference for Vegetable Oil

Preferences were different: 37% of participants preferred aluminium cans, 33.5% glass bottles, 17.6% plastic bottles and 11.9% pouches. Storage time and safety are the top concerns of oil buyers, with glass and aluminium being most favoured. This implies that plastic can be phased out by using eco-friendly, long-lasting alternatives.

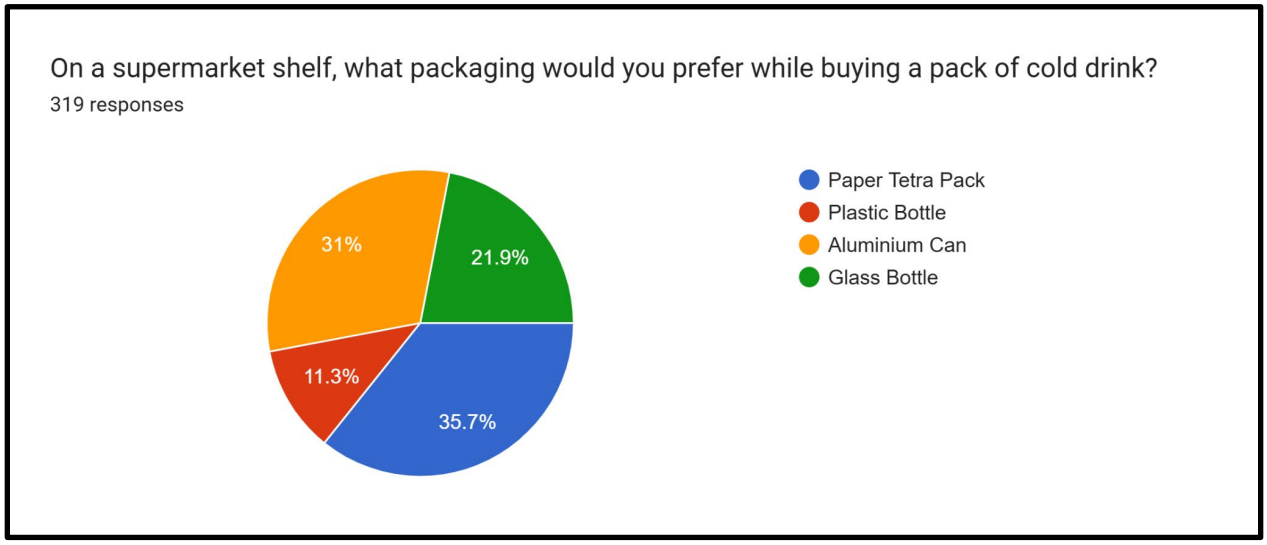

Figure 4.14: Packaging Preference for Cold Drink

Most popular were paper tetra packs (35.7%), followed by aluminium cans (31%) and glass bottles (2.9%). Fewer had crystals, 11.3% selected plastic. Drinks show the change in consumer confidence over recyclable or biodegradable packaging in the highly conspicuous consumer markets.

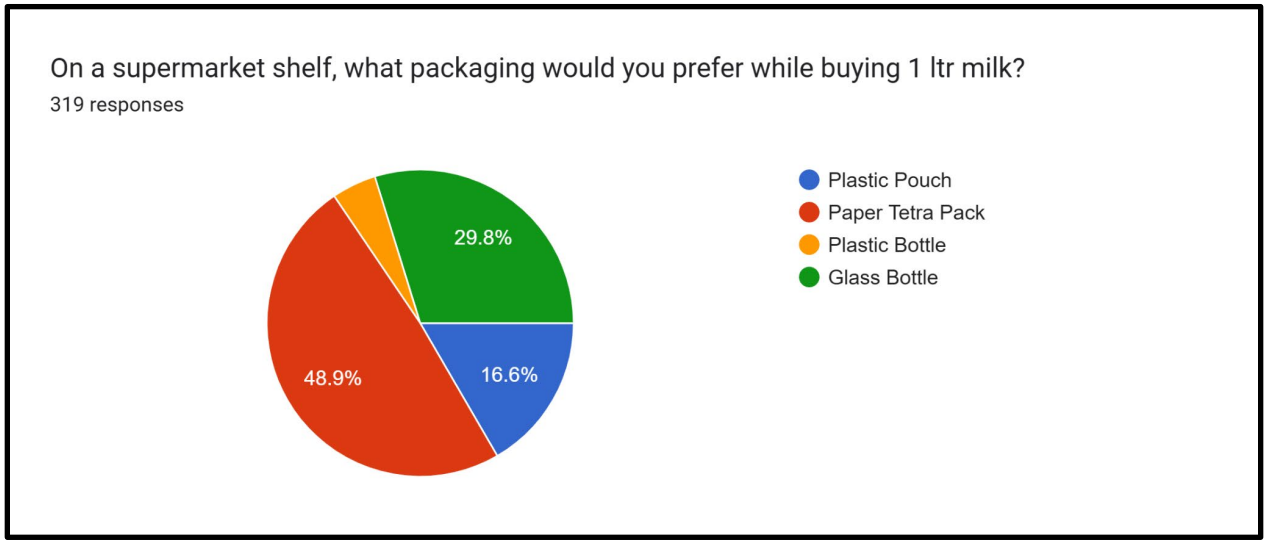

Figure 4.15: Packaging Preference for Milk

Paper tetra packs dominated (48.9%), followed by glass bottles (29.8%), plastic pouches (16.6%), and bottles (4.7%) were the slow entrants. This shows a high receptivity of paper and glass to pack perishables as the consumers trust safety, hygiene, and environmental friendliness pipe total oils.

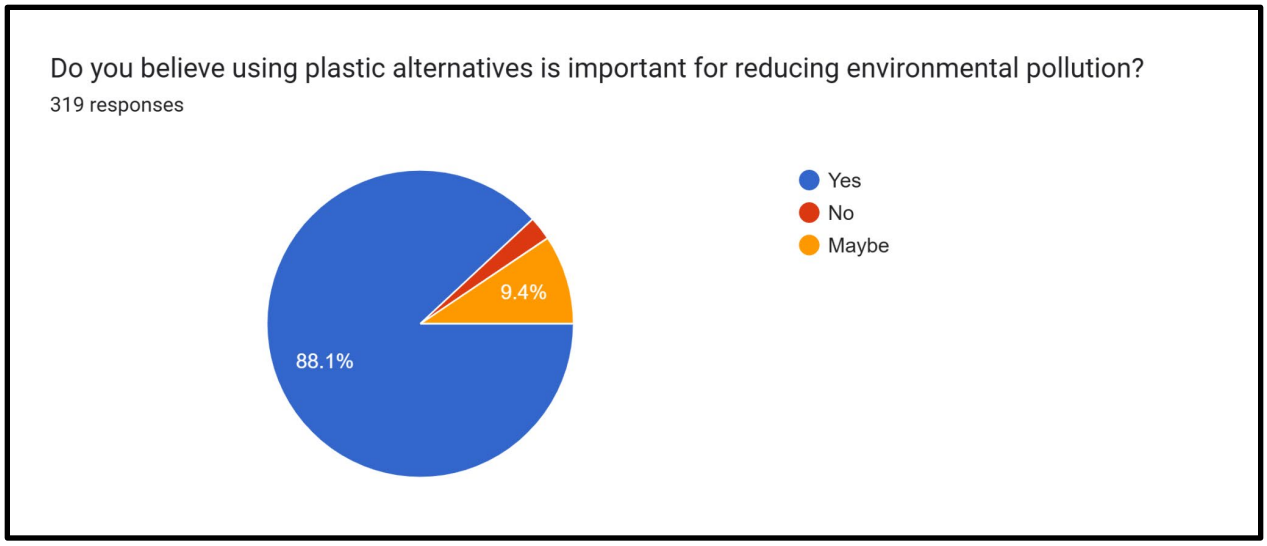

Figure 4.16: Plastic alternatives are important for reducing environmental pollution

A majority of 88.1% were in favour of the affirmative, and only 2.5% disagreed, and 9.4% said doubtful. This shows a strong willingness to alternatives, which indicates the willingness to take policy measures, eco-packaging, and new sustainable practices to minimise the use of plastics.

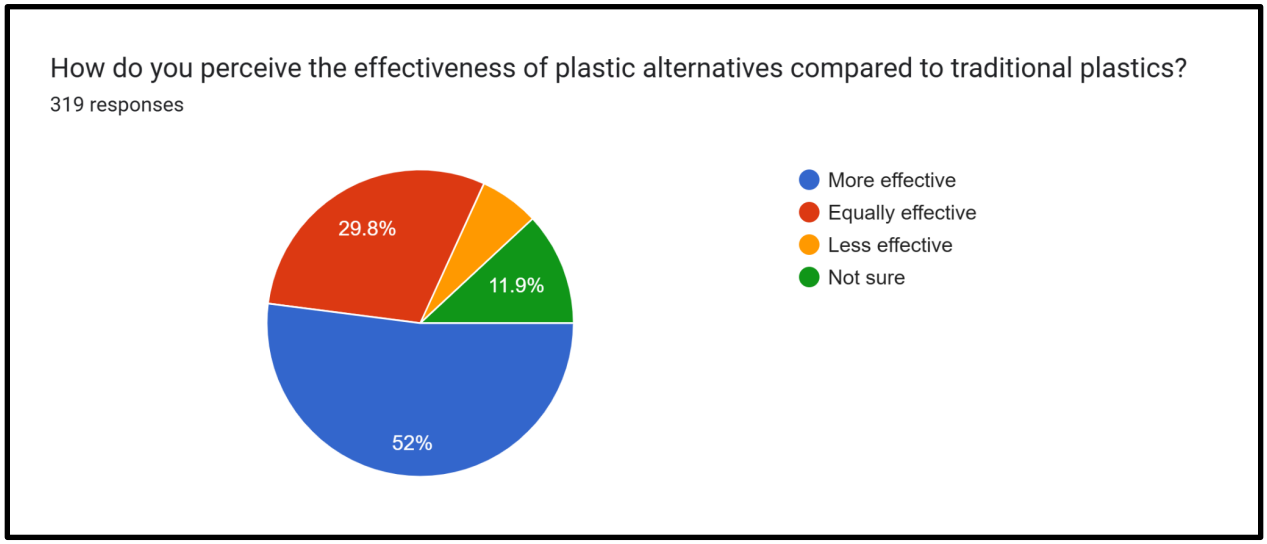

Figure 4.17: Effectiveness of plastic alternatives compared to traditional plastics

The majority (52%) of the respondents perceived alternatives as more effective, with 29.8% perceiving them as equal. Only 6.3% responded as less effective, and 11.9% were not sure. This favourable image increases the chances of biodegradable and recyclable materials.

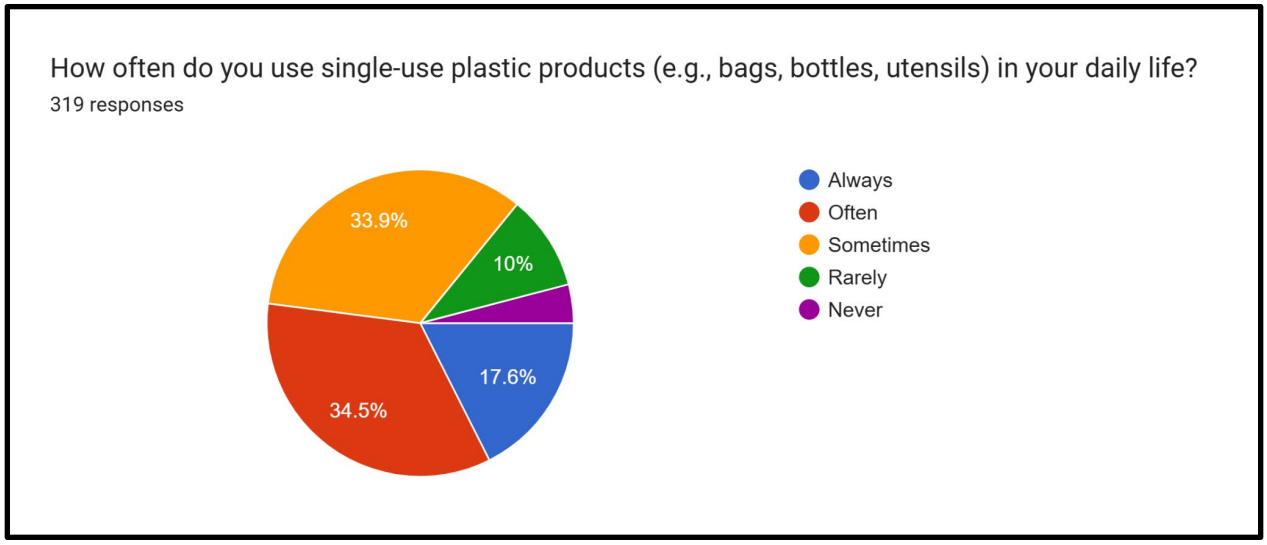

Figure 4.18: Single-use plastic products

A large 52.1% reported using them always or often, with only 4.1% saying never. This indicates that, in spite of the awareness, people engage in the use of plastic due to habitual convenience. Policies or incentives might be needed to influence consumers to switch to something different.

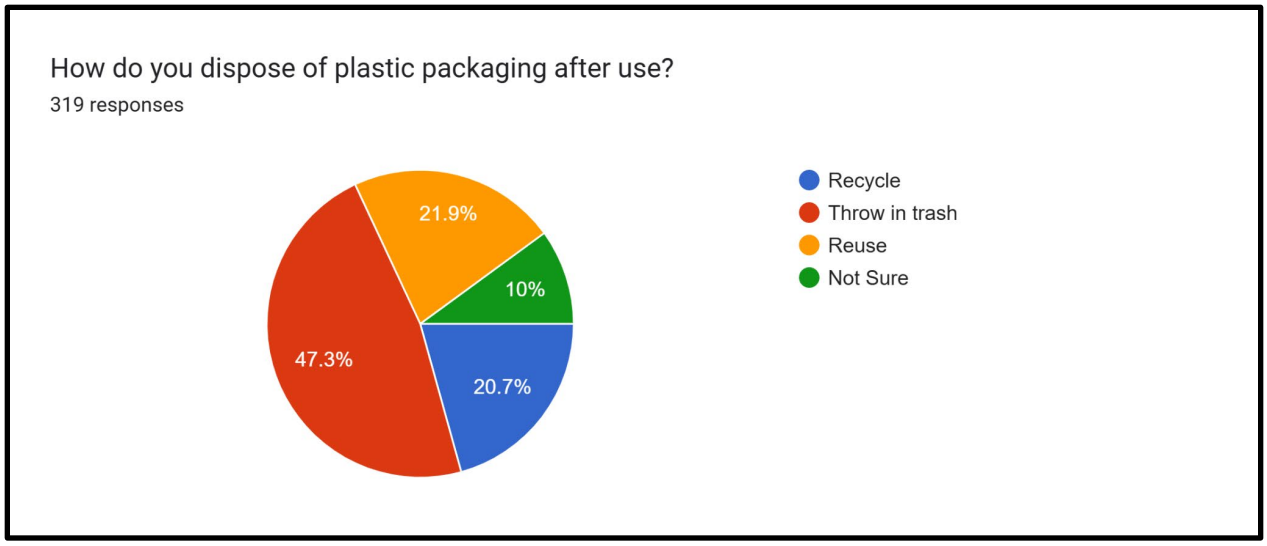

Figure 4.19: Disposal of plastic packaging after use

It is found that almost half (47.3%) of them just put it in the trash, though there are 20.7 and 21.9% who reuse and recycle it, respectively. These points show the lack of waste management awareness and infrastructure in a big way. It is of great significance to reinforce the recycling behaviour.

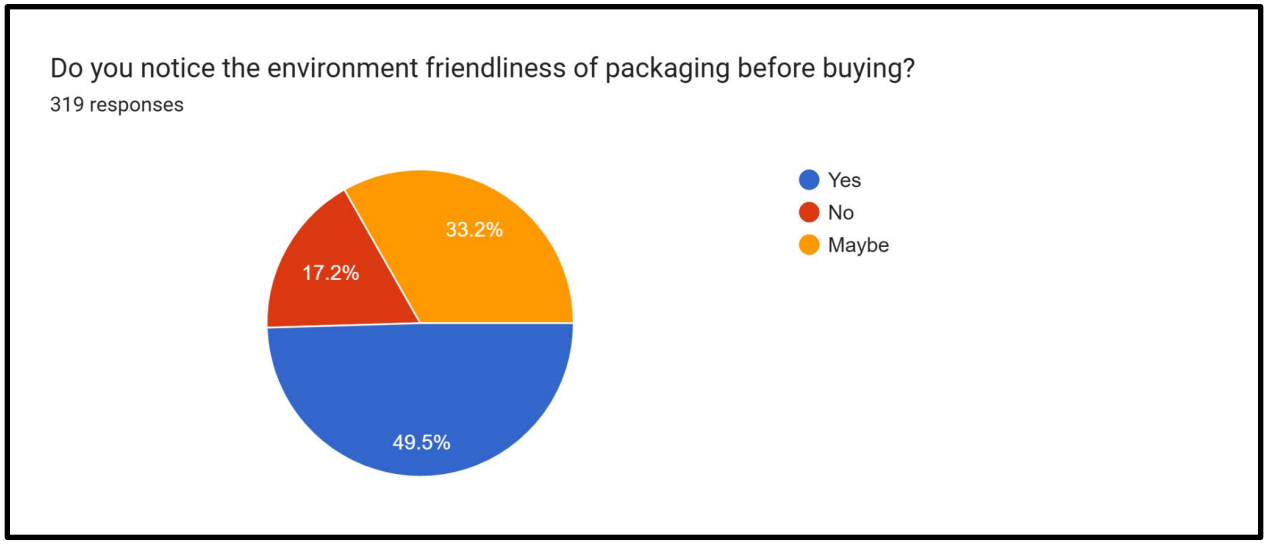

Figure 4.20: Environmental friendliness of packaging

49.5% of respondents responded with a yes, 33.2% answered maybe and 17.2% said they simply forgot about this. This indicates that environmental awareness is starting to affect purchase behaviour, with cost and convenience still potentially dominating over environmental considerations to many purchasers.

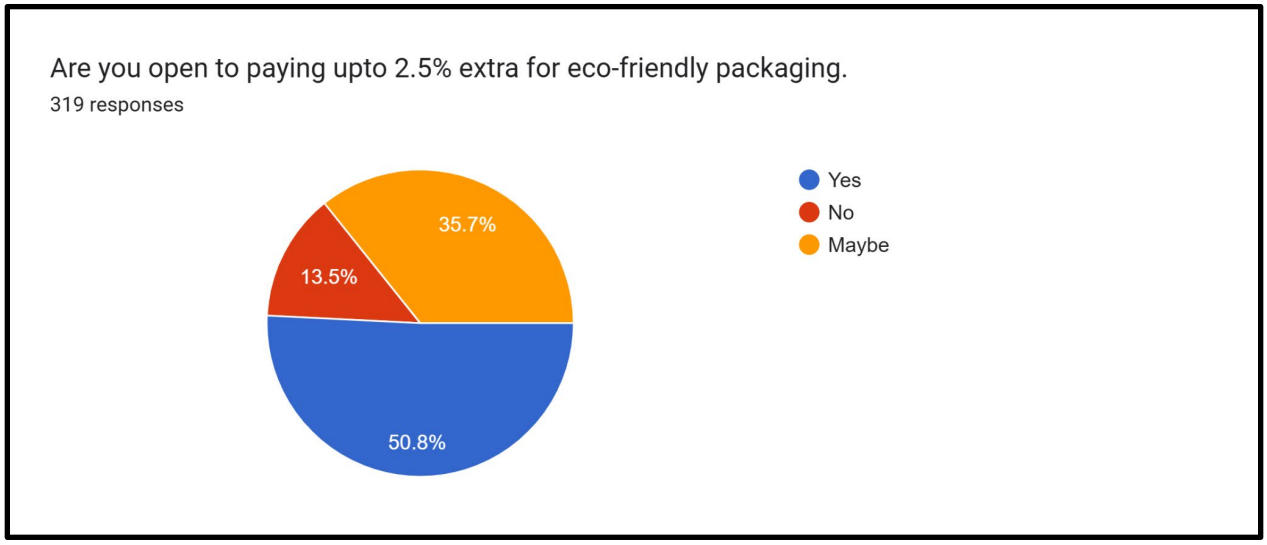

Figure 4.21: paying up to 2.5% extra for eco-friendly packaging

A bit more than half of them (50.8%) approved, a bit less than half (35.7%) were neutral, and a rather small number of them (13.5%) disapproved. The willingness to pay more is a market opportunity, but scholars bear in mind that the issue of affordability is a major factor to consider in the mass-scale adoption.

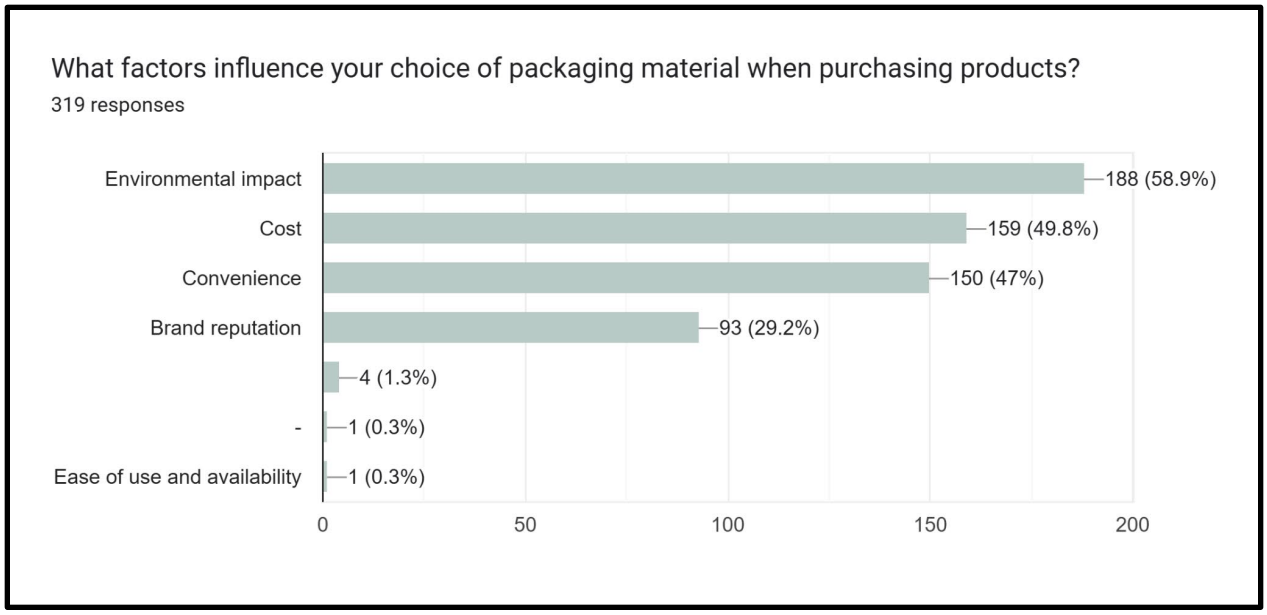

Figure 4.22: Choice of packaging material when purchasing products

The most important factor was Environmental impact (58.9%), then cost (49.8%) and convenience (47%). There is an overall brand reputation that influenced 29.2%. This is an indicator of increasing environmental awareness of the population, as well as significant price sensitivity of consumers.

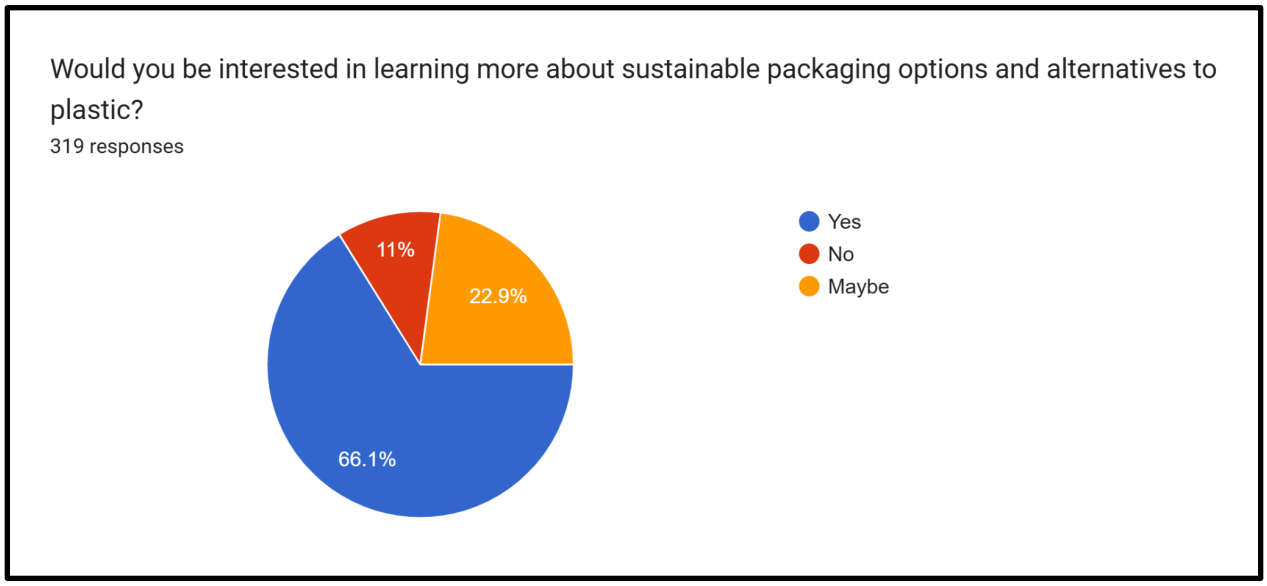

Figure 4.23: Interested in learning more about sustainable packaging options and alternatives to plastic

66.1% were interested in expressing their interest, and 11% said no. This is an indication of the willingness of the consumer to sustainability-based education campaigns, awareness, and brand-based sustainability that can stimulate the consumption of eco-friendly packaging products.

Further Comments or Recommendations

The answers differed greatly, and some popular themes were the usage of single-use plastics, recycling, financial issues, and governmental intervention. Several of them proposed bamboo, jute, or biodegradable materials. In general, comments expressed a sense of urgency to take collective responsibility in plastic pollution reduction and the adoption of alternatives.

4.3 Qualitative data results (Systematic Literature Review)-

No.	Paper name	Author	Findings	Relevance of the study
Theme 1	*"Plastic possibilities: Contrasting the uses of plastic 'waste' in India"*	Dey and Michael, 2021	The article shows that there is a juxtaposition of plastic recycling in India: Waste-to-Energy industrial incineration via Clean India on the one hand and household-based repurposing and reuse plastic management on the other. Technocratic solutions frequently compete with more traditional reuse activities, but grassroots solutions show how plastic can be re-engineered, undergo informal	This paper finds relevance in identifying the way in which Indian consumers get creative and/or repurpose plastic in actions embodying creativity in crafting alternatives to plastic. Comparing policy statements with the local practice reveals consumer attitudes towards sustainability and plastic reduction.

			recycling.	
	"Plastic waste recycling: existing Indian scenario and future opportunities"	Shanker *et al.* 2023	The article refers to the over-reliance of India on recycling clusters, road constructions, and co-processing; it also emphasises polypropylene and polyethene materials as the most significant ones among the reprocessed materials. It highlights potential in the fields of mechanical and chemical recycling, waste-to-energy, bio-polymer alternatives, and the new AI- and blockchain-driven plastic management solutions.	The research is central because it presents the technological routes and material-specific routes of recycling, making information about consumer exposure to recycled plastics and bio-based plastics available. The importance of the knowledge on these innovations can be used to highlight how consumers in India have adopted plastic replacers in an attempt to shift to a circular plastic economy.
	"Emerging Transformations in Material Use and Waste Practices in the Global South: Plastic-Free and Zero Waste in India"	Conlon, 2023	The research report identifies lessons in the new zero-waste industries in India, providing barriers and opportunities to plastic reduction. Stakeholders highlight government, business and social issues, and endorse locally acceptable alternatives, economic factors, and operational plans to address plastic ban and circular, regenerative-based approaches effectively in India.	This research is vital because it may reveal the lived experiences of entrepreneurs and practitioners who have developed and marketed substitutes for plastic in India. Considering the obstacles and displaying local solutions, it reflects the opinion of consumers and the state of the market regarding the readiness to adopt sustainable alternatives to plastic.

	"Plastic Waste Management in India: Challenges, Opportunities, and Roadmap for Circular Economy"	Hossai *et al.* 2022	The article highlights that India is facing increasing plastic waste problems even though the level of consumption is not very high. It reveals global concerns related to reverse supply chains, the source-specific recovery, and gaps in regulations, and highlights the necessity of a comprehensive approach to waste management in light of circular economy principles.	The study is meaningful because it helps to identify the breaches in the system of managing plastic in India, which shape the experiences of consumers in dealing with waste and its alternatives.
Theme 2	*"How does plastic compare with alternative materials in the packaging sector? A systematic review of LCA studie"*	Dolci *et al.* 2024	The review indicates life cycle assessment (LCA) results that plastics are not always the least sustainable variable in comparison with substitutes. Bioplastics are less fossil-intensive but are of smaller advantage than glass, paper, metals, and textiles, which have cost-benefit trade-offs.	This output can be used because it helps to understand the misunderstanding of sustainability by comparing plastics to paper, glass, and aluminium, and bioplastics using LCA. It resonates with customers in India as it shows how science-based evaluations undermine the belief of environmental friendliness and informed decision-making towards efficient substitute plastics.
	"Comparative life cycle	Genoves	In the study, a comparison of fossil-based plastics (PP, PS) and	This paper is applicable because it explains how LCAs show

	analysis of disposable and reusable tableware: The role of bioplastics"	i *et al.* 2022	compostable bioplastics on the basis of LCA was conducted about disposable and reusable tableware. This strategy indicates that bioplastics have an overall lower impact, except for ozone depletion and eutrophication.	trade-offs between disposable systems and reusable systems. To Indian customers, such understandings may show the relationship between the environmental practices of bioplastics and conventional plastics, informing awareness and uptake of sustainable tableware as part of consumption decision-making.
	"Comparative Study of a Life Cycle Assessment for Bio-Plastic Straws and Paper Straws: Malaysia's Perspective"	Moy *et al.* 2021	The research performs LCA of drinking straws concerning bioplastic (PLA) and paper straws. Findings show that PLA straws produced lower environmental loads in terms of global warming, acidification and eutrophication than paper.	The study is important because it shows the trade-offs of the paper and biopolymer alternatives provided using LCAs. Such information, the understanding by Indian consumers provides environmental wisdom in everyday products, such as drinking straws.
	"Use phase and end-of-life modelling of biobased	Molina-Besch, 202	This review identifies significant shortcomings in LCAs of biobased biodegradable plastic materials, such as incomplete consideration of the use stage, and which are based on	The relevance of this study is that it sheds light on the reduced capabilities of the LCA modelling of bioplastics, thus influencing the effectiveness of

	biodegradable plastics in life cycle assessment: a review"	2	generic information at the end-of-life stage. The most important message is that material-specific performance data is needed to enhance precision and minimise uncertainties in quantitative assessments of the sustainability of bioplastics.	the sustainability concept of the materials to consumers and policymakers.
Theme 3	*"Consumer Awareness of Plastic: an Overview of Different Research Areas"*	de Sousa, 2023	The research demonstrates that plastics and alternative solutions have been a topic of consumer awareness and research that has not necessarily aligned with the research priorities of environmental science, engineering, and materials science. Such a disconnect between knowledge and the behaviour of consumers in everyday life indicates a significant obstacle to successful plastic waste reduction and alternative adoption.	The study is applicable because it highlights the disjuncture between how consumers think about plastics and alternatives and the scientific understanding concerning them.
	"Public views on plastic pollution: Knowledge, perceived impacts, and	Soares *et al.* 2021	This research finds that the average citizen focuses on the bio-ecological threats caused by plastic pollution, in contrast to prioritising the social and economic harm. Knowledge of impacts and sociodemographic factors is a significant predictor of	The study is pertinent in that it brings out the way these consumers' knowledge and perceptions influence sustainable behaviour. In the case of Indian consumers, awareness activities to teach the

	pro-environmental behaviours"		pro-environmental behaviour, indicating that informed consumers are more likely to adopt alternatives and reduce plastic-related environmental damage.	advantages and disadvantages of plastic product alternatives can make consumers more pro-environmental, which leads the way to more acceptance and use of environmentally friendly substitutes for plastic products.
	"Drivers of and barriers to consumers' plastic packaging waste avoidance and recycling – A systematic literature review"	Jacobsen *et al.* 2022	The review notes environmental concern and perceived benefits as the main drivers of avoiding plastic packaging and recycling put into practice by consumers, and the lack of knowledge, convenience, and opportunities as the main barriers. It also presents inter-relationships between avoidance and recycling, emphasising the objective requirement of formulating combined consumer engagement approaches.	This study may be useful as it lays out the importance of consumer knowledge in the shaping of behaviours towards plastic alternatives. To enhance awareness of advantages and disadvantages, barriers such as low awareness and lack of convenience should be mitigated in Indian consumers, thus enhancing the adoption of sustainable materials.
	"Consumers' sustainability-related perception of and willingness-to-pay for	Herrmann *et al.* 2022	The study reveals a split opinion of consumers towards plastic alternatives strategies, with many exhibiting promotions to sustainability perceptions, packaging encouraging willingness-to-pay, but uncertainty and a	This research would be useful because it identifies existing knowledge gaps in consumers regarding what to consider in packaging sustainability and what to think about packaging sustainability.

	food packaging alternatives"		deficiency of consensus on sustainability definitions, which slows down decision-making. Packaging consumers are not satisfied with the current state of packaging, even though they recognise the functional benefits of plastic.	
Theme 4	*"Are Biobased Plastics Green Alternatives? —A Critical Review"*	Ferreira-Filipe *et al.* 2021	The review points out the progress of biobased polymers produced with the use of biomass and organic wastes that can lessen the dependence on fossil fuels and carbon footprint. Although these materials present enhanced properties and biodegradability, they also have an impact on issues of recyclability, environmental safety and toxicity, which represent the opportunities and risks of accepting biobased plastics.	This research is topical because it assesses the effects that the use of bio-based plastic alternatives has on the environment, weighing advantages and disadvantages. In the case of Indian consumers, these insights are essential in learning how substitutes minimise ecological burdens even as they pose challenges, ultimately informing responsible use of eco-friendly alternatives to plastics.
	"Environmental impacts of plastic packaging of food products"	Kan and Miller, 2022	The research also makes clear that plastic packaging contributes disproportionately to the overall life cycle impacts of most food they package. Packaging effects are small compared to vehicles, so it is	This research contributes here because it puts the environmental impact of plastics in the general context of consumption, as these sometimes fail to bring

			important to use local assessments to determine the environmental impact of plastics.	overwhelming benefits. To the Indian consumer, these facts may make them realise the need to consider options in perspective before drifting to sustainable alternatives such as plastic packaging substitutes.
	"Current trends of unsustainable plastic production and micro(nano) plastic pollution"	Walker and Fequet, 2023	The review also points out that plastic production is not sustainable, as it is the root cause of micro(nano)plastic pollution that negatively impacts the environment and leads to climate change. Existing management strategies in downstream activities are not adequate, and further concerted effort is needed to shift towards sustainable materials and lower environmental impacts globally.	The research is applicable because it underscores the environmental impact of the continued use of conventional plastics to support the use of substitutes. In the Indian consumer base, awareness about such long-term eco effects can motivate people to consider sustainable alternatives, and thus, they can align their individual preferences with environmental conservation principles.
	"Molded fiber and pulp products as green and sustainable	Zhang *et al.* 2022	According to the article, moulded fibre or pulp packaging affirms itself as an alternative use of sustainable plastic made with plant-based and recycled fibre. It outlines their increasing incorporation into	The study is appropriate because it presents the environmental benefits inherent in the use of moulded fibre options in place of plastics. As Indian consumers, learning about such

	alternatives to plastics: A mini review"		packaging sectors as a result of their biodegradability, recyclability, and lesser taxation of the surrounding environment, making them a possible alternative long-term solution to current plastic packaging materials.	environmentally friendly packaging solutions can assist them in assessing the broader picture of replacements, making environmentally friendly and sustainable decisions.
Theme 5	*"Addressing plastic pollution: Sustainable alternatives and advanced waste management"*	Mishra *et al.* 2024	The research focuses on the integrated solutions that have to merge waste management innovations, producer responsibility, and viable alternatives to plastics. It emphasises circular economy models, advanced recycling and shows that the eco-friendly substitute, along with the help of policy and consumers, can play a significant role in reducing plastic pollution.	The study is pertinent because it shows that although plastic substitutes have merits, they can be used to decrease pollution when accompanied by rigid policies and consumer participation. To Indian consumers, it is an eye-opener about the need for awareness, affordability. Alternatives must be incorporated within the scope of the large-scale sustainable waste management facilities.
	"Impacts of Plastic Pollution on Ecosystem Services, Sustainable Development	Kumar *et al.* 2021	The review highlights how the world is experiencing a heightening plastic crisis, which is attributed to mismanagement that has resulted in significant ecosystem effects. It is centred on event evaluation, cyclical economy alternatives and	This research has significance because it demonstrates that plastic substitutes that are environmentally friendly and backed by LCA and circular solutions are a viable option to curbing pollution. In the case of

	Goals, and Need to Focus on Circular Economy and Policy Interventions"		community participation as key tools.	Indian consumers, understanding and mass mobilisation on whether to embrace alternatives are important in helping consumers in the industry pursue the practices that are aligned with the national sustainability and policy objectives.
	"Plastic bans in India – Addressing the socio-economic and environmental complexities"	Nøkleby e *et al.* 2023	The paper identifies the 2022 prohibition of single-use plastics in India under the PWM Rules as a positive development, but indicates that issues around impacts of alternative materials, industry adaptation, and socio-economic impacts remain critical. Successful transition involves a tradeoff between environmental objectives and social justice, and between sector-specific realities.	The relevance of the study is that it directly evaluates the ban on plastic in India and whether options exist and are feasible. Indian consumers primarily see the issue with plastic alternatives in their awareness, affordability, and the need to be adopted in an equitable manner to ensure that the change in plastic usage does not result in additional burdens on the people.
	"A review of the cost and effectiveness of solutions to address plastic	Nikiema and Asiedu, 202	The review cites worldwide responses to fight plastic and microplastic pollution, including advanced recycling, clean-ups, wastewater processing, and policy initiatives, including product bans	This research is useful since it gauges both technology and policy industry solutions to plastics that are replicable. In the case of India, the implication is the need to use complementary

	pollution"	2	and extended producer responsibility. It focuses on long-term, affordable and locally-resolute measures to minimise environmental and health hazards.	recycling mechanisms alongside materials that are not plastic, to provide measures to consumers, policymakers, and industries to follow a comprehensive approach to pollution reduction.

4.4 Summary of Findings-

This chapter examined the reaction of the consumers and the secondary understandings to indicate that the attitudes towards plastic substitutes in India are mixed. These results showed an increased awareness of environmental impacts, although affordability, accessibility, and durability are some of the obstacles to their greater use. The urban population tends to give preference to eco-friendly means more, whereas the rural population resorts to more traditional approaches. Hence, Chapter 4 showcased the possibilities and problems of a shift towards sustainable consumption patterns in India.

CHAPTER V:
DISCUSSION

5.1 Introduction-

This chapter provides a critical report of the findings of the research along with the research avenues in relation to the literature review, theoretical frameworks, and thematic analysis. The objective is to analyse the perceptions, practices and attitudes of Indian consumers as applied to plastics and alternatives in terms of its current recognition and debates in the academic world. In this chapter, empirical results are combined with existing theories like the Theory of Planned Behaviour, Diffusion of Innovation, Social Cognitive Theory, and the Consumer Decision Making Model, and therefore, the findings provide both confirmations and new developments. It also examines the ways in which thematic knowledge fills in the marker of the literature gap as well as responding to the research questions in a complete way.

5.2 Quantitative analysis-

5.2.1 Describing selected variables-

DV or dependent variables or Pollution reduction: The dependent variable is pollution reduction since it is the final outcome of the ultimate sustainability objective of shifting to alternatives to plastics (Walker and Fequet, 2023). It is directly subject to consumer tastes and preferences, life cycle results of materials, and their awareness. The questions in the survey include the use of plastic alternatives to help limit cases of environmental pollution, the efficacy of plastic alternatives to traditional plastics and others (Nikiema and Asiedu, 2022). This puts the DV in line with the research objective of assessing the role that the alternatives play in significantly reducing the environmental degradation in India. In such a way, the variable can be justified because it measures the effects of consumer behaviour and material choice on environmental sustainability.

IV1 or independent variable 1 or Material type: Material type is an important independent variable since no two packaging materials, such as glass in contrast to paper, aluminium in contrast to biodegradable plastics, and others (Dybka-Stępień *et al.* 2021). As a result, it has completely equal environmental, economic and social effects. The questionnaire

directly poses questions to its respondents on how they feel about the given material in terms of look, cost, and other aspects of the material on other items. Thus, this resonates with consumer perception and choice and has a direct impact on the rate of adoption of alternatives and ultimately pollution outcomes (Naspetti *et al.* 2021). Including the type of material enables the study to compare trade-offs and what types of materials are perceived as the most viable alternatives. Therefore, the IV 1 of material type is reasonable since, without evaluating it, the study may fail to determine what substitutes can best curtail plastic dependency as they are likely to be acceptable to the Indian consumers.

IV2 or independent variable 2 or Lifecycle Performance: Sustainability performance throughout the lifecycle is critical, as a product cannot alone measure the performance through its use (Rigamonti and Mancini, 2021). The Life Cycle Assessment dissertation framework emphasises that paper, glass, aluminium, and bioplastics all have their trade-offs in the form of energy consumption, re-use, and biodegradation (Tanveer *et al.* 2023). Perceptions of the lifecycle are reflected in survey questions that connect environmental impact and environmental cost. This variable is in line with the research objective of determining whether the alternatives provide real environmental advantages or only transfer the problem. It also complicates that the analysis is evidence-based and not merely perception-based. Thus, the incorporation of lifecycle performance adds depth and scholarly feel to the results of sustainability.

IV3 or independent variable 3 or Consumer Knowledge: The contents of the consumer knowledge are crucially significant, as the comprehension and impressions determine purchasing behaviour and the inclination to pay more to purchase eco-friendly packaging (Duarte *et al.* 2024). The survey has several questions that test the knowledge level on topics like plastic substitutes, the eco-friendliness of a package before purchasing and the feeling of being keen to understand more about sustainable packaging options, among others. This ascertains that knowledge does influence attitudes and adoption in great measure. Even the best environmentally friendly materials can fail to take off into the real world unless they have sufficient consumer awareness (Reddy *et al.* 2023). Therefore, this

variable is valid since it suggests behaviourally and informational gaps that have a direct impact on the DV or pollution reduction. It helps the study to capture not only rational decisions but also perception-driven decisions.

5.2.2 Importance of the chosen demographics-

The identified demographics are very useful in this study because they represent the market leader in purchasing products in India. The trend of young adults aged 19-35 years is quite strong, as this age group is the most active, first movers about sustainability behaviour in shopping, and key decision-makers in household shopping. Although the genders slightly lean towards the male side, protection has been given to both the male and female consumer, explaining the extent in aspects of behavioural attitude. The majority of respondents are also urban, and they spend more time exposed to corporate and government sustainability campaigns due to the fact that they are more aware and have better access to alternatives. Incorporation of rural participants also gives information on traditional procedures and limitations in affordability. The income distribution, with the majority of respondents earning below 5 lakhs per annum, provides very important insights on the topic of affordability that rates high in embracing plastic alternatives. Collectively, these demographics would make them representative and also emphasise the socio-economic and cultural aspects that influence consumer attitudes toward sustainable consumption.

5.2.3 Descriptive statistics from scale questions-

Descriptive Statistics

	N	Range	Minimum	Maximum	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
DV	319	14.00	5.00	19.00	8.4389	.15196	2.71414	7.367
IV1	319	25.00	8.00	33.00	16.9969	.22332	3.98858	15.909
IV2	319	14.00	5.00	19.00	10.7429	.13882	2.47943	6.148
IV3	319	20.00	6.00	26.00	13.1505	.20155	3.59978	12.958
Valid N (listwise)	319							

Table 5.1: Descriptive statistics

The descriptive analysis is given to describe the dependent variable, the Pollution Reduction, and the three independent variables, including the Material Type, Lifecycle Performance and the Consumer Knowledge. Therefore, they give a general description of the sample size, which is 319 valid responses. These figures present the pattern of central tendency, variability, and range, which are useful in gathering information on how people feel about the issue of plastic pollution, as well as whether alternative materials are a viable option.

When it comes to the dependent variable (DV), the range is rather large, as the lowest score is 5.00, and the largest one is 19.00. The average outcome of 8.44 indicates that the perception of the respondents on reducing pollution by using alternatives is moderate on average. The standard deviation of 2.71 shows that there is a lot of dispersion around the mean, which is an indicator of heterogeneity when assessing the role of alternatives in mitigating pollution among participants. The variance (7.37) also supports this variety of opinion, as it reveals that though a majority of the respondents think that alternatives are important as far as the reduction of pollution is concerned, others think they are either not so important or lack total trust in them. This discrepancy is critical because it brings out the reality of different consumer attitudes that have to be considered when coming up with strategies to market the eco-friendly packaging.

Moving to IV1 (Material Type), which reflects perceptions of glass bottles, paper pouches, aluminium cans, and biodegradable plastic pouches as observed under parameters of look, performance, cost, and environmental impact, the descriptive statistics are telling; there is a lot of variation. An extensive range of responses with min score of 8.00 and a maximum score of 33.00 also speaks of a wide range of responses capturing the extreme layers of positive and critical appraisal of material types. The average of 16.99 implies that, in general, the respondents have rather positive attitudes toward alternative packaging materials. Nevertheless, the standard deviation (3.99) and variance (15.91) are relatively high numbers, which means that there is a large variance in the way participants rate

various materials. Such fluctuation may be due to trade-offs that consumers perceive between aesthetics, functionality, cost and sustainability, and businesses and policymakers have to consider a trade-off approach that satisfies most of the aspects that consumers are concerned with, instead of focusing only on one.

Regarding IV2 or Lifecycle Performance, which considers the views of the respondents in the performance of materials during all their lifetime, such as how it is produced, used and how it is discarded, the results are crucial. The maximum and minimum of the number of points, 19.00 and 5.00, respectively, indicate that the end users had various opinions concerning the sustainability of the lifecycle. The average of 10.74 is right above 5, and it implies a favourable but guarded view of the lifecycle traits of options. The standard deviation (2.48) and the variance (6.15) are moderate, indicating that there was slight dispersion and a relatively standard set of views among the respondents. This may mean that consumers have a similar perception of the lifecycle issues, possibly due to heightened awareness of environmental issues like recyclability, carbon footprint and biodegradability. The more restrictive distribution supports the notion that lifecycle performance is emerging as a conventional standard on which to base the evaluation of sustainable packaging.

Moreover, IV3 or Consumer Knowledge conveys the level of awareness and knowledge of respondents of the available alternatives of sustainable packaging. The descriptive results have given a wide scale (20 points), where the lowest value and the highest were 6.00 and 26.00, respectively. The average of 13.15 indicates that knowledge levels of those surveyed are average, meaning that they are somewhat familiar with the alternatives, but they also lack knowledge. The standard deviation, 3.60 and variance of 12.96 also indicate a significant difference in the level of consumer awareness. This means that even though some consumers are well informed and actively take into account the eco-friendly features when choosing what to buy, others are less knowledgeable, and this could limit their chances of adopting sustainable features. Notably, the aspect of this variability emphasises

the education, marketing communication and policy awareness initiatives in helping to improve consumer knowledge in order to spur behavioural change.

Therefore, a number of trends emerge through the descriptive analysis. The dependent variable depicts moderate notional differences in the perception of the usefulness of alternatives. There is a great degree of heterogeneity in material type or IV1, which implies that acceptance hinges on the trade-offs amongst the cost, appeal and environmental benefits. The performance of the lifecycle or IV2 shows that the views are relatively less fractious, as there seems to be an emergent consensus that the sustainability of the environment is more than single-use concerns. The knowledge of consumers or IV3 shows the largest inequalities, leading to the necessity of awareness campaigns to fill in the information gaps.

Thus, these findings establish an impeccable empirical backing to any further inferential detection that can confirm that there can be no more than a multidimensionality of perceptions of consumers as formed by the kind of material, lifecycle factors and the degree of awareness. In addition, results are also defensible within the context of a survey design, in that the questions directly measure constructs congruent with these variables.

5.2.4 Descriptive statistics (Frequency analysis)-

On a supermarket shelf, what packaging would you prefer while buying a pack of salt?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Biodegradable Pouch	189	59.2	59.2	59.2
	Paper Pouch	90	28.2	28.2	87.5
	Plastic Pouch	40	12.5	12.5	100.0
	Total	319	100.0	100.0	

Table 5.2: Frequency table for Salt Packaging

The information that concerns the consumer preferences in the matter of packaging the pepper in salt shows a great tendency towards the usage of biodegradable packages in the form of pouches. Therefore, the bias of people in favour of the biodegradable pouches came out to be 189 (59.2%), which represents people shifting towards eco-friendly products. This preference can be traced to active awareness of environmental problems related to plastic packs and is in line with sustainability discourses worldwide. Second in ranking were paper pouches with 90 respondents (28.2), trending toward being environmentally savvy in terms of packaging. As compared to other packaging options, only 40 respondents (12.5%) selected the option of traditional plastic pouches. This shows that the consumers are more aware of the adverse effects of plastic waste and may be amenable to alternative options when they are present. The results support the idea that it can be environmentally sound to replace conventional packaging by using biodegradable ones in the case of staple products like salt that people use in their daily lives and large amounts, thus providing a substantial possibility to reduce pollution through materials exchange.

On a supermarket shelf, what packaging would you prefer while buying a 1 Ltr pack of Vegetable oil?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Aluminium Or Tin Can	118	37.0	37.0	37.0
	Glass Bottle	107	33.5	33.5	70.5
	Plastic Bottle	56	17.6	17.6	88.1
	Plastic Pouch	38	11.9	11.9	100.0
	Total	319	100.0	100.0	

Table 5.3: Frequency table for Vegetable oil Packaging

The most preferred category was aluminium or tin cans, which were chosen by 118 participants (37.0%), possibly because they are long-lasting and post-consumption-usable.

Immediately after, 107 respondents (33.5%) selected glass bottles, which shows that, because of a high information availability level, consumers trust a glass bottle to preserve oil quality and provide a luxurious appeal. More responses were, however, recorded with plastic bottles and pouches of 17.6% and 11.9% respectively, which implies a low acceptance. This shows that there is still a place for plastic, but its leading position is being threatened by the other solutions that are believed to be safer in health terms and more environmentally welcoming. The almost equal distribution into aluminium cans and glass bottles indicates an equal importance of consumers planning to pay attention to both the environmental impact and to products. The balance presents the view to manufacturers who want to match their sustainability promises with usability necessities of commodities of importance to consumers.

On a supermarket shelf, what packaging would you prefer while buying a pack of cold drink?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Aluminium Can	99	31.0	31.0	31.0
	Glass Bottle	70	21.9	21.9	53.0
	Paper Tetra Pack	114	35.7	35.7	88.7
	Plastic Bottle	36	11.3	11.3	100.0
	Total	319	100.0	100.0	

Table 5.4: Frequency table for Cold drink Packaging

In the packaging of cold drinks, paper tetra packs received the majority rating of the consumers, with 114 (35.7%) of respondents showing a preference for the package. This is an indication of both convenience and economic sustainability because the Tetra packaging is lightweight and can be recycled and even marketed as environmentally friendly. Aluminium cans were also second best among the respondents, with a total of 99 customers (31.0%) showing their potential trust locally in aluminium to hold a beverage.

Aluminium cans are recyclable and have a guarantee to consumers in the market because of their acceptance over the years. The converging response was to glass bottles (70 respondents or 21.9%), which is interesting, as it indicates less consideration of reusable packaging as an alternative to throwaway packaging. Reusable packaging might be considered, but only as a traditional method of packaging, which may have the disadvantage of being fragile and expensive. The least preferred of all was plastic bottles, with only 36 respondents (11.3%) in favour of plastic bottles, which is another sign of decreasing plastic bottle consumerancy. The statistics suggest a high consumer focus on packages that offer sustainability together with functionality, and it is an indication that the companies involved in the beverage industry can find an opportunity in strategically switching the plastic bottles to materials which are less environmentally harmful.

On a supermarket shelf, what packaging would you prefer while buying 1 ltr milk?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Glass Bottle	95	29.8	29.8	29.8
	Paper Tetra Pack	156	48.9	48.9	78.7
	Plastic Bottle	15	4.7	4.7	83.4
	Plastic Pouch	53	16.6	16.6	100.0
	Total	319	100.0	100.0	

Table 5.5: Frequency table for Milk Packaging

In the case of milk packaging, the respondents prefer tetra packs made of paper, with 156 (48.9) of them preferring it to be their first choice. This shows that about half of the consumers appreciate the convenience, safety, and eco-friendliness that is brought about by this packaging. Glass bottles, chosen by 95 respondents (29.8%), underscore that consumers continue to trust glass as a suitable container to protect freshness and to be reused but cost and handling issues might limit the use of glass much more widely. Only a

fifth of responses mentioned plastic pouches (16.6%) and plastic bottles (4.7%), and hence a great use of plastic packaging in such products of day-to-day life needs like milk, is whistled by consumers. The results indicate that tetra packs are supreme because they are practical, space-saving and portrayed as friendlier to the environment. This high rate of adoption indicates that there is indeed a great potential for paper-based options in heavy consumption dairy markets, which may go a long way to help India become less dependent on plastic.

How do you dispose of plastic packaging after use?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not sure	1	.3	.3	.3
	Not sure	31	9.7	9.7	10.0
	Recycle	66	20.7	20.7	30.7
	Reuse	70	21.9	21.9	52.7
	Throw in trash	151	47.3	47.3	100.0
	Total	319	100.0	100.0	

Table 5.6: Frequency table for Disposal Practices

The analysis of disposal practices presents critical insights into consumer behaviour that directly affects environmental sustainability. A majority of respondents (151, or 47.3%) admitted to throwing plastic packaging in the trash, reflecting a significant gap in sustainable waste management practices. Meanwhile, 70 respondents (21.9%) indicated reusing plastic packaging, showing some degree of circularity at the household level, though this does not address the long-term disposal issue. Recycling was reported by 66 respondents (20.7%), suggesting moderate adoption of environmentally friendly practices, but far below optimal levels. Alarmingly, 32 respondents (10.0%) were uncertain about how they dispose of plastics, highlighting a lack of awareness or engagement with waste practices. These results underline a critical disjunction between consumer preference for

sustainable alternatives and their actual disposal behaviour. Addressing disposal practices remains central to achieving true pollution reduction.

5.2.5 Analysis of the suggestions given by respondents-

Recommendations on possible plastic replacements

Respondents pointed out the necessity to cut down plastic dependence due to the combination of behavioural change, awareness, and policy support. Several of them recommended the increased use of cloth and paper reusable bags as well as eco-friendly products, and some were very specific to use eco-friendly products like jute, bamboo, and areca leaf wrapping. Some of the participants requested more aggressive governmental measures, business responsibility, and government subsidies to make the alternatives affordable. There were also questions raised regarding the environmental trade-off between paper and aluminium, with issues of recycling and reuse of these commodities emphasised. In general, it can be stated that people are in serious need of collective accountability, individual decision-making, market creativity, and government action to find any possible way of change.

Issues that affect decisions on packaging material

Environmental impact came up as the most important factor in selecting packages, with many participants ready to spend more to have sustainable packages. Cost and convenience played a key role too, particularly on the lower-end income groups, who considered alternatives to be less economical or convenient. The other influencer was brand reputation, since sustainability allowed environmentally inclined consumers to rely on companies that implemented eco-friendly packaging. Some respondents emphasised the need for durability and availability, mainly when grocery shopping and acquiring foodstuffs.

The know-how of plastic substitutes

The respondents also displayed a knowledge of several substitutes such as biodegradable plastics, paper, glass, aluminium, jute, bamboo, and bagasse products. The next most common alternative was biodegradable plastics, an idea that appeared convenient to many

and presented an eco-friendly image. The paper was also widely acknowledged, with some pointing out the issues of deforestation and wet weather resistivity. Glass and aluminium were credited with the aspect of recycling, but they were condemned as being more expensive in energy when it comes to manufacturing. Innovation in materials like coconut fibre, wheat straw and recycled materials was also cited, and this shows the interest in experimentation with new options. However, there is a gap that still needs to be filled so that the wrong perceptions can still be corrected; this is acknowledging that most people still have a bad perception that everything labelled biodegradable is that they can decompose naturally.

5.3 Thematic analysis (Themes derived from Systematic literature review)-

5.3.1 Codes

Main Code	Sub codes	Importance
Consumer Awareness	Knowledge Gap	Lack of adequate knowledge is an obstacle to achieving informed adoption of plastic alternatives that affect consumer attitudes and sustainable consumption behaviour in India.
	Behaviour Change	The key to the adoption of alternatives is a change of consumer behaviour, which means awareness campaigns, nudging, and supportive social norms.
Material Assessment	Lifecycle Impact	The life-cycle analysis shows that there are tradeoffs between plastics and alternatives, pointing to sustainable material selection and realistic policy moves.
	Environmental Trade-offs	Alternatives face trade-offs realising the existence of obscure costs, which make it mandatory to critically think before presenting alternatives as products of overall environmental friendliness.

Policy Support	Regulatory Framework	The regulatory barriers, such as prohibitions and incentives, forma strong regulatory framework in which consumer adoption achieves the required level of accessibility, affordability, and normality of alternatives.
	Government Initiatives	Consumer awareness, incentives, and campaigns fill in the knowledge gap of consumers and fuel eco-friendly behaviour.
Market Dynamics	Cost Affordability	The large cost is a significant volition, without a decrease in price sustainable alternatives may be out of reach of low-income earners in India.
	Industry Innovation	Industry innovation on eco-packaging, bioplastics and fibre products leads to adoption and this also complies with the consumer expectations on sustainability.
Sustainability Transition	Circular Economy	Circular economy principles implement reuse, recycling and bio-material alternatives so that it can reduce plastics pollution in the long term.
	Waste Management	The realisation of effective sustainability of the chosen replacement of plastics requires funding of adequate waste management facilities in the Indian set-ups.

5.3.2 Theme 1: The plastic alternatives are eventually accepted and would be used long-term, depending on the consumer awareness and transformation of behaviour in India.

The focus of the aim may be explored by breaking it down into the perception and use of plastics and substitutes by Indian consumers in terms of the viability of pollution reduction, their patterns of either selection or non-selection of substitutes. This situates a behaviourally based, awareness-dependent adoption theme squarely at the purpose and

study questions of the study, which focuses on consumer knowledge, LCA evidence, and adoption barrier facilitators.

More importantly, the clause of the theme is to be interpreted conditionally by Awareness Transformation in terms of Knowledge Depth and Behaviour Adoption. Hence, awareness is contextual to practices and evidence-based on the long-term practice gaps in disposal, as a proxy indicator that knowledge should translate into sustainable habits. This can be used to empirically reinforce the need to have further knowledge translate to sustained buying, use, and disposal to achieve sustainability.

This condition is echoed in systematic review evidence. Soares *et al.* (2021) also confirm that pro-environmental behaviour is predicted by impact knowledge and socio-demographics. In addition, Jacobsen *et al.* (2022) single out the knowledge and convenience as key and deterring factors. Moreover, Herrmann *et al.* (2022) identify an increased willingness-to-pay with perceived sustainability, but it is mitigated by the uncertainty in the definition. Conlon (2023) and Nøklebye *et al.* (2023) state that the key to acceptance revolves around the availability of locally agreeable alternatives, affordability, and the elements of just transitions. In analysing the policies of the municipality of Saclay, Dey and Michael (2021) show how grassroots reuse is competing on the same field with technocratic solutions, which means that the behavioural change needs to be close to home to be practised consistently. Collectively, these studies provide an empirical foundation for Knowledge Depth as a means to establish Behaviour Adoption leading to Long-term Acceptance.

Similarly, the theme of informed acceptance fits with the LCA-oriented goals that warn that alternatives are not always the most “green.” In Dolci *et al.* (2024) and Moy *et al.* (2021), material trade-offs are revealed, whereas in Molina-Besch (2022), gaps in modelling are anticipated. Communicating such subtle differences is importan,t such that it is evidence-based and not slogans-based, supporting sustainable adoption that is resistant to green myth-busting. Along with this, the LCA sections would provide the platform for this science-based awareness. It can be stated that the long-term acceptance in India

requires more focus on adaptation policy supported by infrastructure management (Subramanian *et al.* 2023). Thus, it can be stated that theme 1 is correct as it defines the requirement for knowledge to behaviour within in supportive system to ensure the final implementation.

5.3.3 Theme 2: The lifetime analyses show that every alternative has some environmental cost-benefit drawbacks requiring careful consideration in rendering more environmentally friendly decisions.

The research problem is to comprehend the consumer adoption of plastic alternatives in India, whereas the objectives would be to assess the environmental implications and consumer awareness in the development of sustainable choices. The development of the elaborate nature of lifecycle analyses makes the theme directly capture the research aim of evaluating the science side on one end, and the consumer on the other end.

This position is confirmed by empirical evidence conducted within the context of the systematic literature review. As another example, Dolci *et al.* (2024) show that plastics are not always environmentally less suitable since alternative types of transportation and production of glass and paper are more resource-intensive. Similarly, Moy *et al.* (2021) point out that the global warming potential of PLA bioplastic straws is lower compared with the paper straws, but still with environmental trade-offs. These results demonstrate that the replacement of plastics is not always advantageous and needs to be considered further depending on the material. This is consistent with Genovesi *et al.* (2022), who find that the bioplastics have a lower impact in some of the categories anda higher impact in others, so it is necessary to have a balanced assessment.

The lifecycle impact continues the lack of awareness of consumers when they think that all alternatives are environmentally friendly without trade-offs (de Sousa, 2023). This wrong understanding creates a hindrance in sustainable decision-making and loosens environmental Trade-offs. This difference can be filled with knowledgeable communication through LCAs to allow people to make responsible choices in terms of the ecological situation, as demonstrated in Soares *et al.* (2021), where the notion of awareness is strongly associated with pro-environmental behaviour.

This theme is significant in that the consideration of the trade-offs on the environment does not just apply to scientific practices, but it is also necessary behaviorally. The use of alternatives in India is subject to the lessening of misunderstandings and facilitation of evidence-based behavioural modification (Pathak *et al.* 2025). Thus, Theme 2 critically agrees with the Environmental Statistics Foundation and such objectives of this study as socio-behavioural requirements.

5.3.4 Theme 3: Regulatory support in the form of policies and government efforts increases consumer consciousness, price competitiveness, and commercialisation of substitutes.

The paper directly aims at identifying Indian consumer attitudes and behaviours with respect to using plastics and alternatives, and to guide effective policies. It is important to analyse tracing the role of state action in bringing about awareness, affordability and uptake of substitutes (Jayaraj *et al.* 2024). It aimed at producing policy-relevant knowledge concerning any 'interventions, policies and awareness programmes' to achieve a balance between environmental, economic and social viability, which directly predicts the levers mentioned in Theme 3.

In addition, this paper devotes a section to government actions, including education awareness programs, financial incentives, bans and a green collaboration between citizens and businesses in implementing implementation strategies that fall squarely within consciousness, price competition and commercialising the market. Regulatory instruments can have multi-channel effects, as shown by the SLR. Strong transition driver India is seen to have a positive effect on its 2022 single-use plastics ban, although it raises distributional and feasibility concerns. That is because complementary policy toolkits like EPR, bans, and targeted subsidies and infrastructural investments ameliorate cost disparities and scale up substitutes (Kumar *et al.*, 2021; Nikiema and Asiedu, 2022; Mishra *et al.*, 2024). There is some evidence on consumers that demonstrates that knowledge and perceived impacts advance pro-environmental behaviour anda deficiency in convenience is a stem precisely the limitation that public policy can continue (Jacobsen *et al.*, 2022; Soares *et al.*, 2021). Transaction-cost evidence also serves as a reminder that alternatives have tradeoffs, which

explains why governmental policies should ensure the mobilisation of both accurate life-cycle information and prices in the form of macroeconomic incentives (Dolci *et al.*, 2024; Genovesi *et al.*, 2022). The analysis of policy effects on EPR and policy-industry collaboration also favours the commercialisation channel in the form of aligning producer incentives with opening up the market to using non-plastic options.

Therefore, information asymmetry can be accomplished by reducing the asymmetry gap through a conscious channel like mandated labels, public education, and outreach by the state, and since the dissertation aims to evaluate the consumer knowledge, information asymmetry would be used. The Price Subsidies represent competitiveness such as fiscal incentive or GST relief, or procurement preferences that close price gaps that would otherwise create disincentives to adoption and open the way to scale economies, commercialization (Nikiema and Asiedu, 2022). By linking awareness, such as demand formation, prices like affordability, and commercialisation, such as scale-up of the supply, within a well-documented policy design in India, Theme 3 operationalises the integrative goal of bridging consumer behaviour designs witha pathway to reduce plastic dependence in India.

5.3.5 Theme 4: The cost of affordability and innovation within an industry creates market dynamics that affect consumer acceptance of to use of sustainable packaging solutions.

The research aims to gain insight about the factors which drive consumers to use plastic alternatives in India, and affordability and the level of industry innovation prove to be one of the key determinants of consumer affordability. The alternative packaging solutions, especially the ones that are greener, cost more than the conventional plastics, which means that they are inaccessible to many (Nøklebye *et al.*, 2023). This strengthens the code Market Dynamics in terms of the node cost affordability. However, in the absence of affordable alternatives, especially in price-sensitive markets like India, the product may not be readily accepted by the consumers, irrespective of their desire to be green.

In addition, the innovation within the industry contributes to the perception of the market and regrets of the consumers to move towards sustainability (Acuti *et al.* 2022). Other

alternatives, especially the use of moulded fibre packaging, offer ecologically friendly and biodegradable products that respond to the suggestions of the customers with the slow increase in price competitiveness. Innovation becomes not only technological but also strategic since the industry needs to live in regulatory environments and deal with the alternating consumer demand (Mishra *et al.* 2024). These innovations re-establish market dynamics by coming up with solutions that are both functional and affordable while also time sustainable.

Indeed, Herrmann *et al.* (2022) unveil that consumers are willing to pay a sustainable packaging additional cost only under the condition that the package conveys a visible functional and environmentally friendly advantage to them. In the same way, Hossai *et al.* (2022) stress that the inefficiencies in waste systems and the cost of substitutes diminish the effective running of the circular economy. The chosen theme of interaction of affordability and innovation consequently directly feeds into consumer acceptance, and it is therefore both theoretically informed and practically grounded. Looking at the issue through the lens of both cost affordability and industry innovation, it may offer a subtle entry in explaining how sustainable packaging can be a ready, viable solution to be used by mainstream society. Thereby, Theme 4 is not only true but also vital to building a construct to incorporate research objectives, which can provide insights to policymakers and the industry of India striving to initiate sustainable transitions of packaging.

5.3.6 Theme 6: Sustainability transition necessitates the incorporation of a circular economy and good waste management facilities to lock down effective plastic reduction in India.

The integration of circular economy models and waste management systems is conceptually consistent with both a micro-level consumer-based intervention and a macro-level structural change focus of the study. The literature, therefore, supports the idea of this theme. The circular economy node mentions reuse, recycling, and sustainable alternative materials, which several reports state to be key to the successful plastic reduction (Hossai *et al.*, 2022; Mishra *et al.*, 2024). As has been demonstrated, closed-loop recycling coupled with biodegradable packaging alternatives is not only effective in the reduction of virgin

plastics but also provides systemic channels of translating sustainability (Kumar *et al.* 2021).

On the same note, the waste management node also highlights the infrastructural and institutional structures that would need to be put in place to facilitate the transition. Research in the SLR shows that the current waste management systems in India are disjointed, regulatory and infrastructure weaknesses exist, and operations are rife with inefficiencies, making it difficult to adopt alternatives to plastics (Hossai *et al.* 2022). However, it is stated that in the absence of effective waste processing, with its lack of intensive segregation and recovery, the environmental impact of alternatives, including bioplastics, cannot be fully exploited, negating sustainability transitions.

This theme is critical as it changes the discourse beyond the consumer responsibilities to encompass plastic reduction in the context of wider socio-technical systems. Thus, the interdependence of consumer adoption, policy support, and readiness of the infrastructures highlighted the complexity of the sustainability transformations in developing countries such as India (Alka *et al.* 2025). Thus, the idea of circular economy and the sturdy waste management inclusion is not only accurate within the framework of the study, but it is also empirically confirmed as a necessity to implement plastic reduction in practice.

5.4 Discussion on quantitative results-

5.4.1 Overall discussion

The descriptive analysis revealed the distinct demographics among the surveyed sample, including the preponderance of younger participants between the ages of 19-35, which amounts to 82.8% and the biased male population, which constitutes 60.2%. Such results are typical of the corresponding consumer behaviour indicated in modern studies, as the younger and urban audiences tend to be more aware and receptive of sustainability-related topics. The leading results further supported this, as they revealed that environmental impact, convenience, and brand reputation were the dominant factors that affected the decision by consumers concerned with packaging alternatives. Compared to the literature review, there was a close correlation with previous research that proposes similarities to how youthful consumers are both ecologically worried and ready to accept regular green

choices. Nevertheless, the current results also indicate a more complex correlation, especially that of environmental concern versus convenience. Thus, where the literature previously tends to focus on environmental values as the most relevant predictor of sustainable consumption, here the evidence indicates that convenience likely plays almost as important a role, and indicates a potential change in consumer priorities (Lee and Hung. 2024). These findings affirm the long-established paradox between awareness and real behaviour. Nevertheless, further questioning shows that this is not only a psychological but a structural gap. The expensive nature of substitutes, deficient waste systems, and unstable availability of environmentally-friendly goods systematically stalls consumer behavior. It means that even consciousness activities cannot provoke behavioural change, they should be supplemented with wider institutional intervention strategies, including subsidy, investment in the infrastructure of the circular economy, and regular observance of regulations. Thus, the discussion indicates that, despite reinforcing much of the existing body of knowledge, it also adds value regarding the emphasis on the interdependence of sustainability, practicality and demographic pressures in the determination of consumer decisions.

5.4.2 Relationship with theory

The findings of the study can be fruitfully analysed based on the Theory of Planned Behaviour (TPB) and the Consumer Value Theory. TPB postulates that attitudes, subjective norms and perceived behavioural control influence behavioural intention. The results confirm this framework, with respondents having a high and positive attitude to sustainable packaging, such as environmental impact as a major driver and social and cultural norms that increase eco-friendly behaviour, especially among young people. The high value configuration of convenience, however, indicates that perceived behavioural control, such as how easy it is to adopt a behaviour, is also a very important moderator of intention. This indicates that sustainable behaviours and practices tend to be encouraged when they are environmentally helpful as well as convenient and easy to undertake. On the same note, functional, emotional, and social values are highlighted by Consumer Value Theory in the stimulation of consumer decision-making (Tanrikulu, 2021). As the results

of the study demonstrate, importance is placed on such aspects as functional value, convenience and ability of a product to be used, social and ethical value, such as brand reputation and being a good steward of the environment. Presenting this dual stress concentrates that, though moral responsibility is important, pragmatism can not be ignored. Also, gendered response patterns confirm the differences in value orientations, wherein males tend more towards convenience and females towards the environment-related issues-agreeing with theoretical approaches to gender and its relation to consumption behaviour. Thus, the results confirm theoretical constructs and indicate that there is a need to incorporate practical use into the models of sustainability consumption, thus expanding the scope of behavioural theory to the real world consumer issues.

5.4.3 Meeting the literature gap

In the literature review, a gap was seen between the attitude of the consumer and real behaviour in differing socio-economic backgrounds. Whereas the literature may be mainly generalised across populations, this study fills the gap of evidence that behaviour among consumers may not be a consistent one since it may be mediated by demographic, cultural and economic background. The major conclusion proved through descriptive analysis is that despite the environmental concerns that consumers have, its environmentally friendly status has not created a dominant power in the purchasing process in terms of affordability, accessibility, and brand trust. The present revelation adds to the literature by providing empirical evidence that sheds light on the gap between actual intentions and conduct, an aspect that has not been explored in previous studies. Besides, the research closes the existing gap between the urban and rural demographics, as the perspectives of these two classes of consumers are foodless in the mainstream research. In so doing, it informs an elevation of theory by revealing how consumer adoption is shaped by the context, and providing practical tips to businesses that want to reach a wide range of customers.

5.4.4 Relation with the research question

- Results indicated that affordability, accessibility and reputation superseded environmental concern, contrary to the literature providing ethical concern as the preceding factor.

- Descriptive analysis has confirmed diffusion theory, where younger and urban customers are quicker to adopt than older and rural customers.
- Despite what is suggested in the literature, brand reputation came out as a determining factor, which implies the corporate involvement in creating consumer confidence.
- There is a gap between what people say they are concerned about the environment on the one hand and what they do on the other, as they place cost and convenience above their environmental concerns.

5.5 Discussion on qualitative results-

5.5.1 Overall discussion

The results of the research are consistent with the literature review and especially in proving how the prevalence of sustainable behaviour has risen through consumer behaviour adoption. Hence, environmental awareness and regulatory provision are in the largest part of plastic minimize, and the results demonstrate that consumers are now keen on reflecting on the existence of eco-friendly options of packaging when they make such purchases (Aithal, 2024). The thematic analysis revealed the importance of factors like environmental concern, brand reputation, and convenience that align with previous literature that determined these factors to be relevant in shaping the decision pattern of the consumers. Also, the literature implied that behaviour change should be supported by the structure, and findings reflected that there is a growing support towards policy-driven changes, such as bans and incentive,s which back up the theoretical arguments about outside helpers to sustainable actions. The results, importantly, also contribute to the literature by exposing the existence of a generational divide, where younger consumers are more willing to use plastic alternatives, hinting at the fact that demographic grounds are also a more crucial factor than the ones that remained unexplored in prior studies. In such a way, this study supports much of the theoretical basis and further adds the details of how sustainability practices are affected by the cultural and demographic order, supporting the idea that the consumer shift towards circular economy practices is socially motivated and structurally determined.

5.5.2 Relationship with theory

The findings of the research directly overlap with the theories that were presented in the literature review. As an example, the Theory of Planned Behaviour (TPB) proved to be backed when the attitudes to the subject and subjective norms impacted the consumer packaging decisions and the consumer packaging behavioural intentions proved to be predictive. Similarly, the Diffusion of Innovation (DOI) Theory manifests itself in the results, with biodegradable plastics and paper shopping bags seen as innovations, with young customers also being one of the first adopters, who can affect the broad market adoption. The Consumer Decision Making Model also applies because environmental implications, convenience and brand familiarity were all relevant to consumers at all levels of decision-making, which is by the rational evaluation of alternatives described in the model. Additionally, the results support the Social Cognitive Theory because the process of observational learning and the fact of social influence contributed to consumer preference for the sustainable option. Interestingly, the results go beyond these theories because the contextual variables in the form of demographics, especially age and income, enhance or limit behavioural adoption, hence the classical theories need the integration of contextual variables. Theory of Planned Behaviour describes how intentions are formed, Diffusion of Innovation describes the adoption process rates, Social Cognitive Theory discusses peer pressure, and Consumer Decision-Making Model sheds some light on rational trade-offs. The interaction between awareness and intention and structural constraints would thus be better represented by a synthesised framework and would authenticate the explanatory view of the thesis.

5.5.3 Meeting the literature gap

The thematic analysis helps to address the identified gap in the literature as it presents empirical evidence in regards to consumer perceptions and behaviour drivers of plastic alternative adoption in India. Whereas the existing body of literature majorly covered situations in the western world, this paper points out cultural, economic, demographic variations of an emerging economy. It confirms that consumer behaviour is determined not only by their environmental consciousness but by affordability and convenience that are

not studied well in the previous studies. The findings fill the literature gap by proving the scholarly discussion on the impact of younger consumers as change agents, thus, achieving the stated purpose of the study.

5.5.4 Relation with the research question

- The results demonstrate high consciousness of environmental damage, supporting theoretical assumptions and practical values, as people prefer biodegradable and paper products.
- Thematic analysis reveals that environmental concern, convenience, and brand trust are most important, in accordance with Consumer Decision-Making and TPB frameworks in practice.
- The accordance with the Diffusion of Innovation theory, and which also expand on the dimensions of sustainability as demographic.
- The results confirm that alternatives are associated with the lowering of landfill waste and pollution, as well as production costs according to the literature that highlights the concept of nuanced sustainability trade-offs.
- Results indicate that alternatives are achievable so long as there is the availability of affordability, infrastructure, and policy support, which seems to fill gaps in the literature on the contextual feasibility.

5.6 Summary-

The discussion has revealed that awareness, affordability, convenience, and cultures are the factors influencing consumer attitudes to plastic alternatives in India. The results confirm the old theories but also going further to support them because they brought in the effect of the demographics as well as the contextual limits. Thematic analysis closed major gaps in the body of literature by exposing adoption trends across generations and disclosure of interrelations between policy, infrastructure, and consumer adoption. Notably, the research establishes the fact that alternative plastics can minimize environmental degradation under the circumstances of the utilization of supportive systems only. Overall, the chapter makes the research aim stronger and suggests evidence-based implications to

policymakers, business, and sustainability advocates that can guide them in taking effective plastic reduction measures.

CHAPTER VI:
SUMMARY, IMPLICATIONS, AND RECOMMENDATIONS

6.1 Chapter summary-

The aim of the present research was to find out how the Indian consumers view plastics and their alternatives, predominantly considering awareness, attitude, behaviour, and wider environmental, social, and policy context. This paper aimed to evaluate the feasibility of substitutes to plastics, as well as the perception among the consumers regarding their advantages and weaknesses. The logical challenges of adopting substitutes to plastic in India were also evaluated. Based on primary and secondary sources, the research has been able to derive some notable findings that enlighten on the relationship that exists among the consumer behaviour, environmental sustainability and market readiness in India. An important conclusion is that the use of plastics is still rooted in the Indian society mainly owing to their low costs, long-lasting nature, and convenience. It is observed that consumers of various classes still use plastic products and packages, owing to the fact that they are cheap and accessible. Nevertheless, having a good level of consciousness about the adverse environmental effects of plastics is especially in urban centers. Respondents would regularly associate the use of plastic with long-lasting pollution to overflowing landfills, clogged drains, and a menace to human and animal health. Such understanding, however, does not always result in long-term behaviour. A significant number of users are displaying an attitudebehaviour gap whereby they voice their concern about plastic waste but still prefer plastic products over convenience and affordability.

The research also shows how there is an increased awareness and incomplete adoption of plastic alternatives, which are biodegradable bags, areca leaf plates, bagasse packaging, and glass and steel containers that are reusable. Consumers are already aware that such alternatives are friendlier to the environment and in some cases culturally identifiable as in the case of areca leaf products. However, there are quite a number of obstacles, which do not allow such large-scale adoption. Among these are the increased prices of alternatives

vis-a-vis plastics, limited supply, especially in rural and semi-urban locations and lack of durability of alternative products examples include paper bags during rainy seasons. Another example is that although medical waste is marketed as sustainable, it is actually of little to no benefit to the environment in India since there is no large-scale commercial composting being practiced there currently. In such a way, the perceptions of consumers can be most frequently influenced by marketing statements and social desirability but not thorough knowledge of life-cycle effects. A significant finding or conclusion that can be drawn out of the study is that systemic infrastructure matters when it comes to determining sustainability of alternatives. Aluminium and glass recycling materials assume a well-developed collection and recycling systems, which are expensive to establish and maintain. In India, these networks are disjointed, unstructured and deprived of order, which results in uneven performances. In the same measure biodegradable products do not work without proper composting and waste segregation systems. In absence of these supports, the adoption of alternatives presents a danger of new environmental pressures, e.g. resource intensive production processes or careless disposal.

A key role is played by the government policy and the initiatives of corporations. Indian authorities have also made significant decisions which include the prohibition of single-use plastics and Extended Producer Responsibility (EPR). In the corporate sector, there has been the use of green marketing and CSR by many businesses, advertising eco friendly packaging and campaigns. Although these initiatives are commendable they are usually confined to urban markets and consumers in the middle to high income bracket, and this singles out large percentages of poor consumers who still rely on plastics. Effective change requires that policies and corporate approach toward sustainability address affordability, accessibility, and inclusivity so that sustainable solutions are feasible to everyone across all socio-economic contexts. The other conclusion picked is that cultural practices and traditions offer fertile soil to sustainable alternatives. The culture of using natural materials in the house as has been long time such as leaves and jute in Indian households and communities implies that sustainability is not alien to Indian cultures. Revival of such tradition-held remedies and expanding them on a larger scale is a strong solution to

overcome the use of plastic when equipped with modern amenities. The consumers may show greater adoption towards alternatives that have compatibility with the culture to which people are familiar, affordability and convenience.

The paper reiterates the importance of established theories e.g. Theory of Planned Behaviour and the Diffusion of Innovation Theory as far as behavioural study is concerned. Attitudes, subjective norm and perceived behavioural control are predominant factors that influence decision making of consumers. As an example, biodegradable bags would be more likely to be carried by consumers in urban areas because of the peer pressure and need to protect the environment; however, those in rural areas may remain attached to using plastic bags because of willpower, low cost, and unavailability of alternative means. Likewise, such innovations like the bioplastics or refill-and-reuse models are sometimes picked up by innovators and the early adopters, before entering the mainstream. The part is to quicken up this process of spread by making alternatives more noticeable, less expensive, and more convenient. The consumers tend to be operating under false notions as to the green virtues of substitutes. It is assumed by many that the all the biodegradable products can decompose in the environment, with some assuming that it takes places naturally and requires no industrial process. On the same note, although paper bags can be deemed as environmentally friendly, the intensive amount of water and energy needed also makes them resource-intensive. Indeed, this underlines the necessity of focusing education campaigns to close the perception-reality divide and allow consumers to make better informed choices. Clear communication, labelling and certification are important instruments of correcting the mistakenly held beliefs and establishing trust. The article also emphasizes that plastic alternatives are not sufficient, to resolve the plastic pollution problems in India. They may be effective and can play a key role but may only be successful with other measures like efficient waste segregation, increase in facility of recycling, nudging and changes in the system in policy. Unless the systemic gaps are closed there is a danger of simply transferring the issue when one material is replaced by another.

Economically, the wave towards the alternatives to plastic brings opportunities and also challenges. On the one hand, the industries manufacturing biodegradable packaging, bagasse products, or containers which could be used many times, can create new markets, new job places, and improvements. On the other hand, when there are disruptions in supply chain of plastic, the livelihood of workers and small vendors is also impacted mostly low-income workers. These trade-offs represent the interactivity of economic development and it is important to find a balance that makes sure sustainability does not mean impoverished social injustices. Such risks can be alleviated by affordable access to alternatives, direct subsidies to small business. Thus, the provided research shows that Indian consumers know about environmental dangers of using plastics and are slowly becoming receptive to using the alternatives. Nevertheless, the handicap of the given transition is the questions of affordability, accessibility, durability, and the infrastructural gaps. The sustainable change has to be multi- dimensional involving consumer education, infrastructural reformations, implementation of regulations, inclusive marketing procedures. India cannot do away with plastics immediately, but a shift, involving sensitivity towards culture and economy, initiated and maintained by robust long-term structures, towards alternatives seems a promising way forward. Thus, this study is useful in knowing how consumer behaviour, cultural practices, and other factors contribute to the future of sustainable material use in India.

6.2 Linking with objectives-

- Among the major alternatives were biodegradable and compostable bags, areca leaf, bagasse products, reusable containers made of glass and metal, paper, and aluminium, which were classified in the study. The study revealed using the insights of life cycle assessment that, no material is universally sustainable and each comes with its own trade-offs in using energy, water and resources. This goal was achieved by showing how each alternative is stronger and weaker in India context.

- The results showed that alternatives are capable of mitigating visible plastic waste, especially in cities, rivers and the shorelines. However, they are only viable with an enabling infrastructure, affordability and consumer behaviour. The analysis

ended with the conclusion that alternatives are not quite feasible unless there is a big overhaul in terms of waste management and production. This goal was thus met in-depth

- The thematic sampling and analysis revealed affordability, availability, and durability, and cultural familiarity amongst the main determinants of consumer choice. An attitude-behaviour gap was identified where consumers speak up about the issue but still choose plastics because it is convenient. This goal was achieved to the letter and it gave detailed information on behavioural dynamics.

6.3 Recommendations-

6.3.1 Recommendation 1: Enhance the Waste Management and Recycling Infrastructure

When it comes to sustainable transitioning off of plastics, waste management systems may be the key to success. In its present form, India is short of industrial composting facilities, disjointed recycling systems especially glass, aluminium and paper. Concretising this infrastructure involves such centralised and decentralised interventions. The heavy investments must be placed on the large scale that includes the investments into the city-wide material recovery facilities (MRFs), composting units, and biogas plants to cope with the growing amount of alternative materials. Examples of the measures that can be taken at the community level include local small-scale composting and biogas projects that allow households and institutions to process biodegradable waste properly. It can be stated that, equal priority is bringing the informal waste-picking industry into the formal systems giving them training, protective materials and increased salaries and utilising their knowledge in gathering the waste (Pariaker, 2024). Not only would this increase the rates of recycling, but it would also lead to social equity. By establishing stringent norms on waste segregation, rewarding the adherers and investing in methods of monitoring the same, it can be assured that the plastic alternatives may not litter the landfills the same way plastics do. Upscaled infrastructure, a set of measures to facilitate sustainable consumption, may be the backbone of it all because this may define whether or not alternatives really decrease pollution but it only transfers environmental degradation.

6.3.2 Recommendation 2: Maximize Efficiency of Sustainable Alternatives

The Indian consumers make their decisions based on affordability and accessibility of plastic alternatives. Although the earnings of the middle and high-income social layers of a city might allow them to choose more environmentally friendly products, the heavy majority of low- and middle-income segments still use their cheaper plastics. Most of the alternatives such as biodegradable bags or glass containers, or packages made out of bagasse, have remained more costly than plastics, hence not adopted on large scale. Moreover, governments must initiate subsidies, tax increase and low-interest rate financing on manufacturers of the sustainable alternatives to reduce the production cost which in turn leads to reduced retail prices (Pulicherla *et al.* 2022). Locally produced goods should also be promoted especially with the more familiar products such as jute, areca leaf, and bagasse that are plentiful in rural India. It is not only a form of cost reduction but also becomes a source of rural jobs and local economy. Avenues of distribution of alternatives should go beyond urban to semi-urban and rural distributions via the ability to create co-operatives, self-help groups and even e-commerce facilities. Retailers must be motivated to hold more affordable sustainable products to ensure that the consumers do not see them as special products. Making sustainable materials affordable and accessible may help roll those out of the luxury items and into the mainstream realm. Working on this economic limitation may help propel the bridge that separates the consumer intentions and their purchasing behaviours.

6.3.3 Recommendation 3: Enhance Information on the Consumers and Change Means

Consumer awareness serves as an indispensable factor towards consumer decision making; however, this paper identified that most of the public does not have accurate information about the environmental effects of substitutes. Numerous consumers trust that all-biodegradable products naturally decompose or that paper always is sustainable without playing attention to its energy or the amount of water consumption. To overcome this, extensive educative campaigns should be established that aim at highlighting the life-cycle effects of various materials, where they should be disposed and the need to segregate waste.

A multifaceted approach with the use of television, social media, schools, and community events should be used to attract the attention of as many people of various demographies as possible (Wang *et al.* 2024). Strict eco-labelling and certification schemes should be established to help lessen greenwashing and allow the consumer to make a choice freely. More than awareness, behavioural nudges can change consumer behaviour. An example is that, the supermarket and delivery companies can give offers to customers who show up with reusable bags or during eco-packaging. Refund systems Glass bottles and aluminium cans can be promoted through deposit-refund systems. It is possible to normalise sustainable practices through community-based efforts through challenges in the neighbourhood, or school competitions. The objective must then be to close the gap between attitude and behaviour by ensuring action resulting out of environmental concern. Increased awareness and behavioural nudging may enable consumers to make responsible choices and therefore would provide demand-side pressure that supports both systemic sustainability trends and corporate sustainability efforts.

6.3.4 Recommendation 4: Encourage Public and Private Partnerships and Inclusive Enforcement of Policy

The replacement with plastic substitutes cannot be left to the government prohibitions or consumer preferences in isolation; the process needs to be a collective act. Partnerships between the public and the private (PPPs) play a key role in filling infrastructural, price-accessibility, and innovation gaps. Governments should coordinate with businesses, NGOs and start-ups to build eco-markets, refill stations and re-usable packages systems. Business involvement in Extended Producers Responsibility (EPR) should not only be limited to compliance; it should also invest in collection and recycling and awareness programme among the consumers. Likewise, rigorous implementation of policy needs to be harmonized between regions. Although single-use plastics have been banned in India, poor enforcement combined with the existence of loopholes has meant that such banned products were found still in circulation (Kanwar *et al.* 2023). Strict control, penalty against non-compliance, and standardization of biodegradable and compostable products are needed to ward off greenwashing and get accountability. Concurrently, inclusivity ought

to be emphasised. During the transition, small sellers and small-income populations that depended on plastics intensively should be offered financial and technical assistance. Training, loan schemes and the integration of informal waste workers into the formal sectors may ensure sustainability may not increase socio-economic stratifications. Through encouraging collaboration amongst different players, both, public and private, enforcing the regulations in a fair manner and creating inclusivity, India can easily accelerate the uptake of alternatives in a manner that is not only environmentally productive but is socially level.

6.4 Research limitations-

There are various limiting factors to this study. Firstly, it is only specific to India, and thus, such findings may have only limited applicability to other nations due to different socio-economic and infrastructural realities. Second, the primary survey data was useful in the understanding of consumer behaviour but it can be possible that the response may be because of social desirability, thus leaving a gap between their stated attitudes and their practice. Third, secondary life cycle assessment (LCA) data were utilized to assess alternative evaluation, and this might not be fully comparable to specific production and waste management conditions in India. Fourth, the sample omitted the representation of all demographic differences, especially in rural and low-income groups, which represent large consumption of plastics but are also underrepresented in intensive surveys. Lastly, the research was carried out during a certain period when there are rapidly changing policies, technologies, and consumer preferences. These limitations indicate that the findings are context-dependent and time-based and therefore needs updating and further research.

6.5 Research implications-

The research poses important theory and practice implications. Theoretically, it does enhance the sustainability and consumer behaviour body of knowledge as it uses the theories of behaviour, including the Theory of Planned Behaviour and Diffusion of Innovation, in explaining how the attitude, norms and socio-economic impediments influence the consumer behaviour on the use of plastic replacements, in the Indian context. It is possible to depict that the effects of pro-environmental attitudes on sustainable

behaviours depend on a range of factors. Through this, the thesis can contribute to scholarship and practice in that it expands the current theoretical models and illustrates the limitation they do in the emerging economies. The implications of the findings to businesses are that there is a necessity to innovate in packaging, fair eco-labelling, and extensive use of CSR to appeal to consumers. On a social scale, the research emphasises the necessity of addressing the attitude behaviour dissonance and making sustainable consumption not a purchase available to better-off groups only. On the whole, the work reinforces the knowledge of the circle of people towards circular and sustainable practices in India.

6.6 Future scope and trends

Further work is needed in tracking future developments in consumer behaviour patterns with the possible effects of awareness campaigns, governmental bans and market innovation. To find a more comprehensive picture of consumer diversity, it is worth to extend the scope into the realm of rural population, who base their preferences on traditional, eco-friendly methods but have to deal with more pressing affordability-related issues. Besides, the emergence of digital commerce and food delivery platforms is transforming consumption patterns and packaging waste, so they are key areas that may be studied in the future as well. Wider investigations on the implementation of circular economy, including deposit-refund-based system, refilling points on packaging, and Extended Producer Responsibility (EPR) mechanism, may enable evaluation of systemic preparedness. Due to the current escalation in sustainability trends across the world, India needs to realign its innovation and policy to ensure that it lessens the usage of plastics through changed consumer behaviours. Future studies should therefore target on scalable, inclusively and culturally anchored solutions that can balance the environmental and economic results

APPENDIX A
SURVEY COVER LETTER

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APPENDIX B
INFORMED CONSENT

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APPENDIX C
INTERVIEW GUIDE

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APPENDIX A:
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