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ǀ**RESEARCH ARTICLE**

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A Study on the Viability of Plastic Substitutes in the Food Service Disposable Industry in India

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Abstract

Disposable food packaging refers to single-use items frequently seen in fast-food outlets, takeaways, and catering places. Typical products include foam plates, bowls, cups, cutlery, doilies, and tray sheets. These items can be made from a variety of materials, including plastics, paper, resins, wood, and bamboo. The original purpose of developing disposable food service items was to improve public health through safer packaging methods in the food service sector. Over time, however, the growing demand for disposables, combined with increasing environmental concerns, highlighted the urgent need for conservation measures. In fast food and takeaway services, large quantities of materials end up as litter, in recycling streams, landfills, or composting facilities. With an astounding 126 million kilograms of plastic waste entering the ocean annually, India is rated fourth in the world in plastic pollution. Hence, the usage of single-use plastic has been outlawed by the Indian government. Since plastic once dominated the disposable industry, the government's progressive limits on single-use plastic have transformed the Indian disposable business. Consumption of throwaway materials other than plastic, like paper, bagasse, aluminium, etc., has risen sharply.

The food and beverage packaging market in India was valued at USD 32 billion in 2022 and is expanding at a compound annual growth rate of 14.8%. However, this shift, driven by the government's regulations, has created a gap in the sector that various substitute materials are attempting to fill. This study provides a thorough analysis of the industry's current state along with a survey examining the consumer acceptability, readiness to try, and efficacy of alternative replacements available on the Indian market.

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1 INTRODUCTION

India has undertaken significant regulatory measures to reduce the usage of single-use plastics. Since July 1, 2022, the Government of India has banned nineteen identified single-use plastic items, including plastic cutlery, straws, stirrers, trays, and pharmocol products, while also tightening thickness regulations for plastic carry bags and PVC banners. Although the policy framework represents a major environmental initiative, enforcement continues to vary across states and urban regions. To strengthen implementation, the government has incorporated Extended Producer Responsibility (EPR), thereby increasing accountability among producers and brands.

As plastics face tighter rules, businesses are quickly shifting to paper and paperboard (often with barrier coatings), moulded fibre/bagasse, bamboo, and aluminium. This study examines the viability of plastic substitutes in India's food-service disposables. The policy context with techno-economics and life-cycle thinking to compare performance, costs, and end-of-life pathways has been combined, so decision-makers can separate solutions that scale from those that simply shift the problem.

2 LITERATURE REVIEW

Durocher F. Joseph (1982), in his article, gives us an overview of typical disposable kinds, identifies several situations when disposables may be used, and warns about potential risks. Bhushan (2019), in his paper, has discussed the recent wave of plastic bans. Single-use plastics in all their forms are prohibited in eighteen states. A national ban is also being planned by the central government. This has expressed disapproval of the prohibition's duration, extent, and products covered by such an effort. Fagundes (2019) has explained how companies are trying to cut down their plastic use. Nestle has planned to phase out all non-recyclable plastic from its products by 2050. They also joined a loop for a subscription-based service where their product will be delivered in reusable containers. These containers will be collected, cleaned, and refilled so that they can be used again. Companies are also opting for plant-based packaging. Ojha et. al. (2015), have discussed product packaging. Although glass was once the most common material used for food packaging, metal and plastic are becoming more and more utilised. Thackston (2013), reveals that most single-use food service items are either plastic-based. Strangely, given the detrimental impacts these packets have on people's health, these are required in the restaurant business for reasons of hygienic and practical reasons; however, emphasis should be placed on the adoption of more environmentally friendly packaging choices, as it will have long-term benefits for both health and the environment. Maheshwari and Bhushan (2016) investigated the impact of Karnataka's plastic ban. Businesses have already switched to packaging made of biodegradable materials, like rice cornstarch forks, glass bottles, and bagasse boxes. Existing literature primarily focuses on either plastic bags, environmental impacts, or general sustainable packaging alternatives. While studies by Bhushan (2019) and Maheshwari & Bhushan (2016) emphasise regulatory interventions, studies such as Fagundes (2019) focus more on corporate sustainability practices. However, limited research comparatively evaluates major substitutes such as paper, bagasse, aluminium, and rice husk on measurable parameters including durability, sustainability, cost, and consumer acceptance within the Indian food-service disposable industry.

3 RESEARCH GAP

After studying the above literature, the gap has been identified, which exists concerning a comparative analysis of the four major substitutes of plastic. Moreover, analysis of consumers' awareness and their preferences can help in fruitful results. Research comprising various tentacles of the topic, including the phased plastic ban by the Indian government, analysis of substitutes on various parameters, and industry-specific depth can fill some gaps.

4 OBJECTIVES OF THE STUDY

The major objectives of undertaking this research have been as follows:

To understand the preferences of customers about different plastic substitutes.

To conduct a SWOT analysis of the different plastic alternatives available.

To understand the consumer spending pattern in the sustainable disposable industry.

To provide recommendations based on the analysis and predict the future trends of sustainable products in the food service disposable industry.

5 RESEARCH METHODOLOGY

Data Collection

Primary Data: The sampling method used in this study is stratified sampling. Respondents were categorised across demographic groups to ensure broader representation and reduce sampling bias. The survey was conducted using structured questionnaires distributed through online platforms. Primary data was collected from respondents across different regions of India. The questionnaire consisted mainly of closed-ended questions and Likert-scale-based responses to measure awareness, preference, willingness to pay, and perception towards sustainable substitutes. The total number of respondents was 101, including 47 females and 54 males.

Secondary Data: Secondary data is collected from different reliable sources such as data from reports published by the FSSAI, The Economic Times, various multinational companies and officially published figures.

Statistical Tools used for Analysis

a) Descriptive Statistics, b) Chi-square Test and c) Pivot Tables**.** The respondent pool consisted primarily of consumers familiar with disposable food service products. The demographic distribution included both male and female respondents across different age groups and occupational backgrounds.

Profile of the Respondents

Variable	Category	Frequency
Gender	Male	54
Gender	Female	47
Total Respondents	-	101

Period of the study: The study covers the entire time frame from the introduction of the ban on single-use plastic in July, 2022 to the present.

6 PACKAGING INDUSTRY IN INDIA: AN OVERVIEW

The Indian packaging market is primarily dominated by domestic producers; however, a few major international packaging firms have made significant inroads there as well.

- Approximately 45–50% of this industry is still unorganised, despite a noticeable shift over the past ten years from a 70% disorganised proportion.
- In 2016, the Packaging Industry Association of India said that the packaging market in India ranked fifth globally.
- 22,000 packaging businesses in India deal with glass, plastic, paper, metal, and corrugated packaging; small and medium-sized businesses make up 85% of these businesses.
- In addition, these packaging companies concentrate on four distinct categories: machinery, accessories, raw materials, and the conversion sector.
- The GDP grows in direct proportion to the growth in packaging.

- In India, each person consumes 8.6 kilograms of packaging, whereas the average consumption in other nations is 25 kg.
- The packaging industry has enormous potential for future expansion due to organized retail and the explosion of e-commerce.

7 ANALYSIS AND FINDINGS

SWOT ANALYSIS

SWOT analysis is used to understand how the different plastic alternatives have an impact on society.

A. Strength

1. Paper Products

Biodegradable: Paper disposables have significant advantages in terms of biodegradability and are frequently promoted as environmentally benign alternatives to plastic. Depending on their thickness and composition, paper products can degrade in weeks to months when the right circumstances are met, such as enough moisture, oxygen, and warmth.

Low cost: Paper disposables are made up of recycled paper, which reduces their cost drastically. Paper is a relatively inexpensive raw material compared to alternatives like plastics or bagasse.

Abundant Supply: Wood pulp from trees is the main source of abundant and renewable raw materials used in the creation of paper. By ensuring a steady supply of raw materials, sustainable forestry techniques reduce worries about the depletion of resources.

2. Bagasse Products

Biodegradable: Because bagasse is mostly made up of cellulose, hemicellulose, and lignin, it is highly biodegradable. Microorganisms like fungi and bacteria are able to decompose them and release nutrients back into the soil. Bagasse breaks down in just 60 days if disposed of properly as compared to synthetic materials like plastics, which can take hundreds of years to break down.

Microwave Safe: Bagasse is safe to use in microwaves. It is a natural plant-based substance made from the stalks of sugarcane or sorghum plants. When heated in a microwave, it doesn't contain any toxic substances or dangerous chemicals that could cause cancer or other health problems. Additionally, it has good resistance to high temperatures and can handle heat up to 95 degrees Celsius.

Good Insulation: The physical makeup of the fibrous substance contains a lot of trapped air, which serves as an insulator. Bagasse is a useful insulator because of the barrier that is created by the trapped air, which prevents heat from transferring. The entire eating experience is improved by these goods, which help to keep hot dishes hot and cold foods cold for extended periods of time.

Durability and Strength: The cohesiveness of bagasse fibres is improved, increasing its strength and durability, by processing methods such as hot pressing and the use of natural binders. Furthermore, bagasse's innate resistance to moisture makes it suitable for food packaging as there is no problem of leakage.

3. Aluminium Products

Lightweight: Aluminium has a density of 2.7 grams per cubic centimetre. This results in low weight of the products, which ultimately helps to reduce the transportation costs.

Impermeable: Aluminium is so lightly bounded by its molecular structure that it prevents air, water and even microorganisms from entering thus preserving food.

Thermal Conductor: Aluminium transfers heat uniformly and this is helpful in heating cooling and other processes.

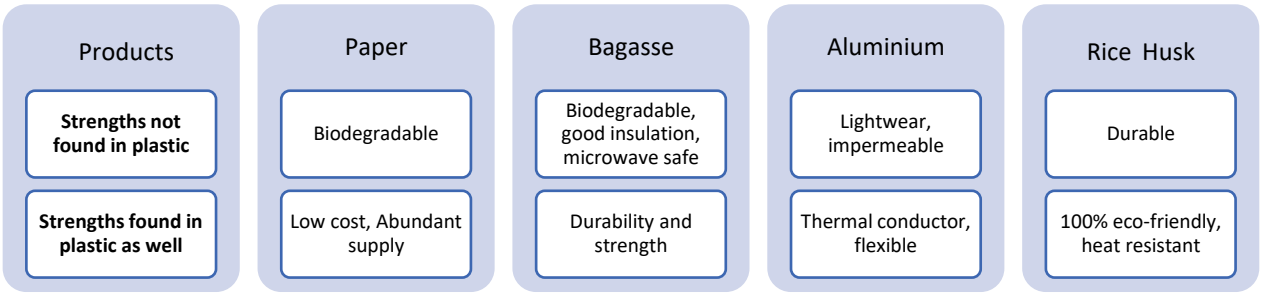
Flexible: Aluminium can easily be moulded in a different shape and can thus be used as per the needs of the users.

4. Rice Husk Products

100% Eco-Friendly: Rice husk is a healthy and environmentally friendly alternative to throwaway plastic because it is biodegradable and made from industrial waste materials.

Reusable and Fairly Durable: Rice husk has a three-year shelf life, depending on temperature and care. Because of this, these pieces are perfect for restaurants, quick food franchises, and gatherings.

Heat-resistant: Rice husk is resistant to heat and cold, unlike plastic, thus it won't melt in extreme heat. This indicates that they are stronger than those made of throwaway plastic. They even work well in a microwave.



B. Weakness

1. Paper Products

Non-Durability: When exposed to dampness or extreme temperatures, paper disposables may not be as long-lasting or sturdy as alternatives made of plastic or bagasse. Because paper disposables might leak or get soggy, they might not be the best choice for hot or greasy meals. This will reduce their usefulness and functioning. Moreover, this also causes damage during transportation and warehousing.

Non-sustainability of Production Process: The manufacturing of paper disposables uses a lot of energy, water, and chemicals, which has an adverse effect on the environment by causing deforestation, pollution of the air and water, and greenhouse gas emissions.

2. Bagasse Products

Difficult Storage: The presence of residual sugar in bagasse makes it difficult to preserve and store for a long time. To maintain their quality, bagasse products must be kept out of direct sunlight and in a cool, dry location. Furthermore, bagasse products can be heavy and need a large amount of storage space.

Cost Burden: The cost of producing bagasse products is sometimes higher than that of conventional alternatives because of a number of factors that are inherent in the manufacturing process. Processing methods, costs associated with innovation and development, market demand and scalability, and higher quality are a few of the reasons for the price hike.

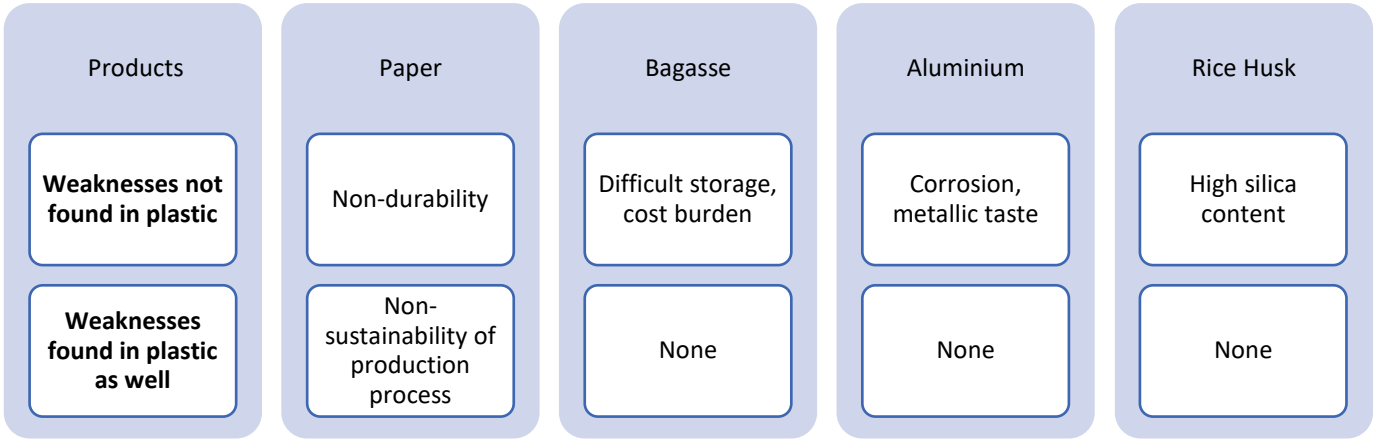
3. Aluminium Products

Corrosion: Aluminium products can sometimes corrode owing to their metallic properties. Due to this, the food packaged inside can be spoiled and will thus destroy the purpose of the packaging material.

Metallic Taste: Aluminium can sometimes leave a taste behind in the food. The taste is of the metal, which can spoil the consumer's experience.

4. Rice Husk Products

High Silica Content: Rice husk when burnt causes the production of undesirable waste which includes ashes and other harmful contents which are detrimental to the human health



C. Opportunity

1. Paper Products

Favourable Government Policies: The use of paper disposables over non-biodegradable alternatives has been encouraged by government legislation and programs supporting sustainability and waste reduction. Paper-based products are becoming more and more common as a result of policies like the prohibition of single-use plastics and the encouragement of recycling initiatives.

Preferred by Consumers: The demand for paper disposables is mostly driven by consumer preferences. Due to the widespread belief among customers that paper is a more natural and eco-friendly material than plastic, this perception affects demand in the market and influences consumer purchasing decisions.

Innovation and Research: The paper industry's ongoing Research and Development initiatives have produced breakthroughs in product functionality and design. Improved qualities, including strength, biodegradability, and water resistance, increase the range of industries where paper disposables can be used.

2. Bagasse Products

Untapped Market: Products made from bagasse have a large untapped potential market due to growing customer demand for environmentally friendly substitutes for traditional materials like plastic and Styrofoam. The unexplored market prospects for bagasse products can be attributed to various factors, including environmental consciousness, governmental constraints, and business sustainability initiatives.

Easy Availability: The easy availability and supply abundance of bagasse products are global production networks and supportive government policies. As consumers continue to prioritise sustainability, the availability of bagasse products is expected to further expand in the future.

3. Aluminium Products

Easy Access: The easy availability and supply in abundance of the metal helps to reduce costs significantly. As consumers sometimes prioritise pricing, the availability of aluminium products is expected to continue in the future.

4. Rice Husk products

Potential Market: Products made out of rice husk have a large potential in the upcoming market. Consumers these days look for products which are good for the environment and rice husk matches that requirement. If the product gains popularity, it can dominate the disposable market in the future.

D. Threats

1. Paper Products

Competition from Alternatives: Materials like plastics, bioplastics, aluminium, and biodegradable materials pose a threat to paper disposables since they may have distinct benefits or appeal to particular market niches.

Perceived to be of Inferior Quality: When compared to alternatives like ceramics or glass, some consumers believe paper disposables to be of inferior quality or less

upscale, which could affect their appeal in particular markets or circumstances.

2. Bagasse products

Plastic Alternatives: Because they are widely available and reasonably priced, traditional plastic products continue to dominate many sectors, even in the face of consumer demand for environmentally friendly products. The uptake of bagasse products may be impeded by competition from plastic alternatives, particularly in sectors where cost is a critical factor.

3. Aluminium products

Better Eco-friendly Alternatives: Aluminium has an impression of non-environment friendly option. As the market is witnessing the entry of more and more new alternatives which are eco-friendly, the product might lose importance.

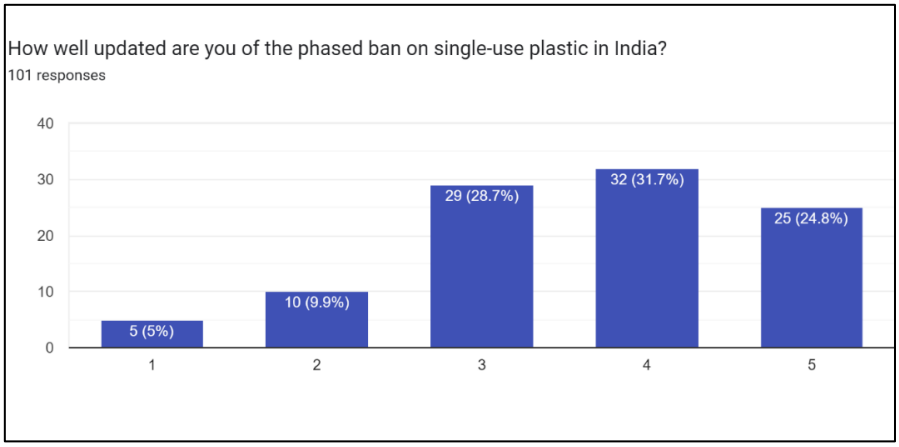
4. Rice Husk products

Lack of Awareness: It is possible that many customers are unaware of the advantages rice husk products have for the environment or of their biodegradability and renewable nature. The market penetration and adoption of rice husk products may be restricted by a lack of knowledge and awareness.

8 DESCRIPTIVE ANALYSIS

Based on the questionnaire, the following analysis can be drawn:

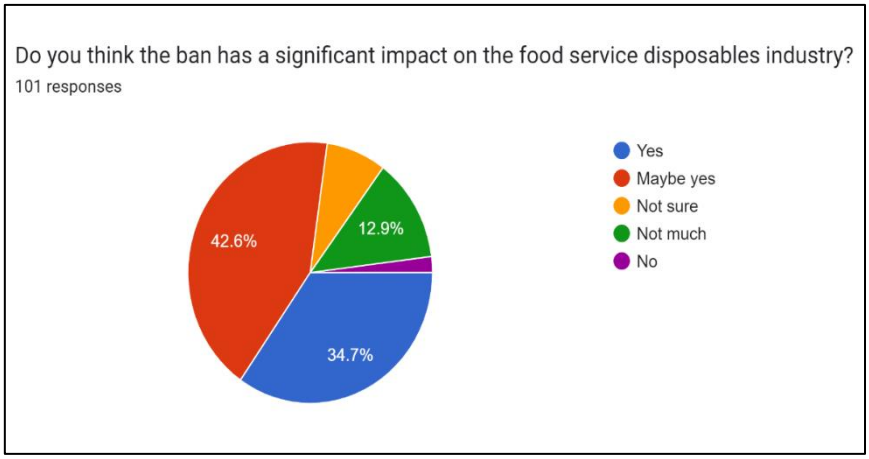
Awareness Information based on the update on the ban



Observation: The scale of 1-5 is in the order of increasing order of being updated with the ban.

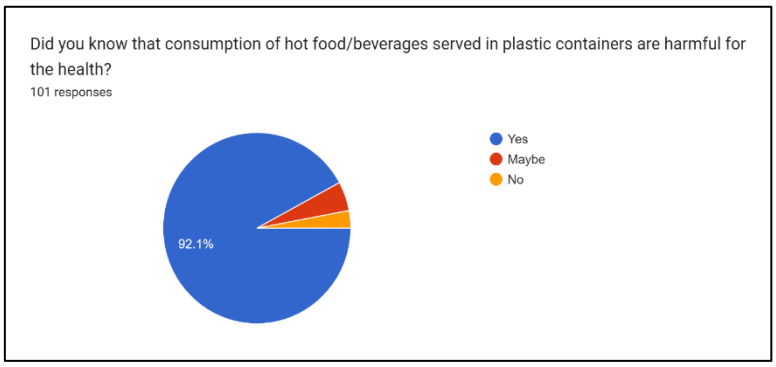
We can notice that the majority of the people are on the positive side of the spectrum, with only around 15% of the sample voting negatively. The remaining 85% are either placed neutrally or better updated with the ban and its specifications.

Based on the Opinion on the Impact of the ban



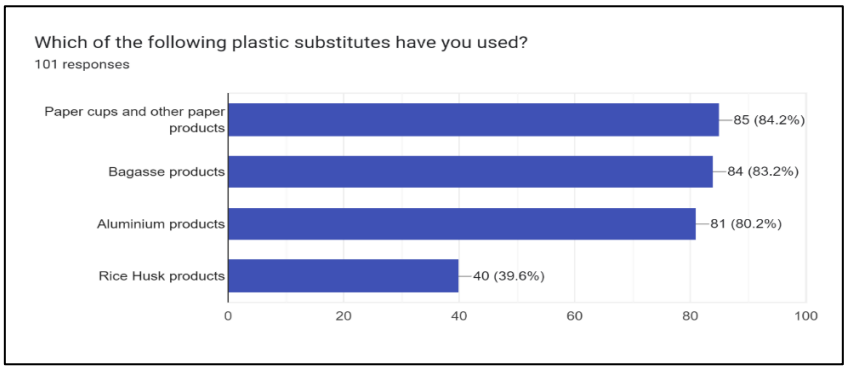
Observation: While the majority of the people are of the opinion that the ban has a significant impact on the food service disposable industry, less than 50% of that cluster gave an emphatic yes to the question. Slightly more than half of the cluster chose the option 'maybe yes'. The rest of the number swung between 'not sure' and 'not much'. A minor percentage of people chose 'no'.

Based on Knowledge of the Impact of Hot Consumables served in Plastic Containers



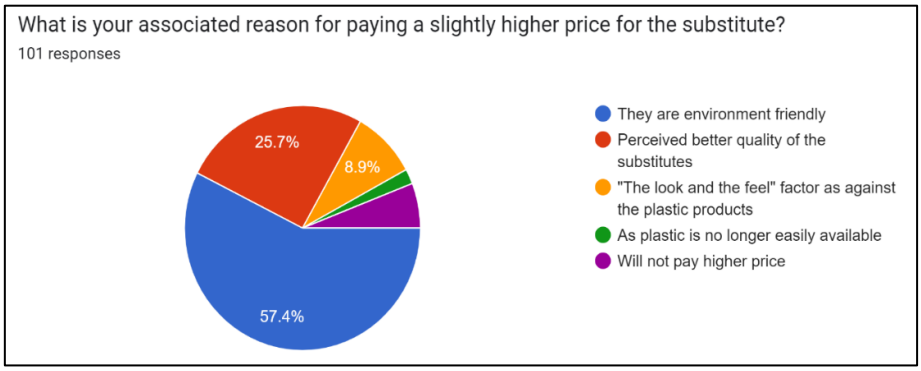
Observation: Most of the people are aware that the consumption of hot food or beverages in plastic containers is detrimental to health. An almost unanimous decision prevails here, with only 8% distributed to two other answers.

Based on Familiarity with the Substitutes



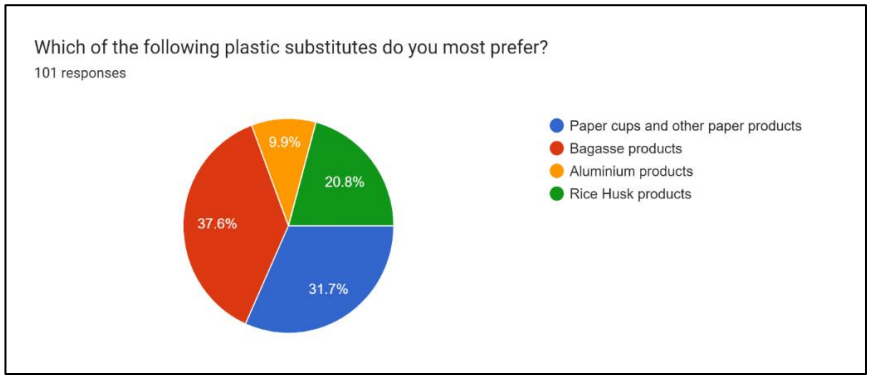
Observation: While most of the people have used paper cups and other paper products, bagasse products and aluminium products, very few people are aware of rice husk. Rice husk as a product lacks market penetration due to various reasons. The highest number of people prefer paper cups and other paper products as a substitute for plastic due to their availability. Bagasse is closely second in the list. In recent times, bagasse has gained much popularity in the disposable industry. Aluminium products have been in the market for a long time now and have a wide consumer base.

Based on the Preference for Substitute



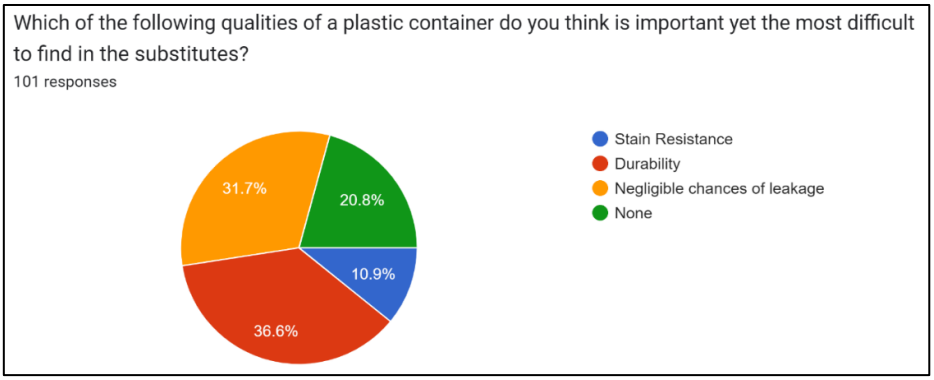
Observation: We can see that the sample is more or less distributed substantially across all the options. The majority of people prefer either paper products or bagasse products, with a slight inclination towards paper products. Third in the choice is rice husk products. Aluminium comes last in the list, probably due to its impression of a metal.

Based on the reason for paying a Marginally Higher Price



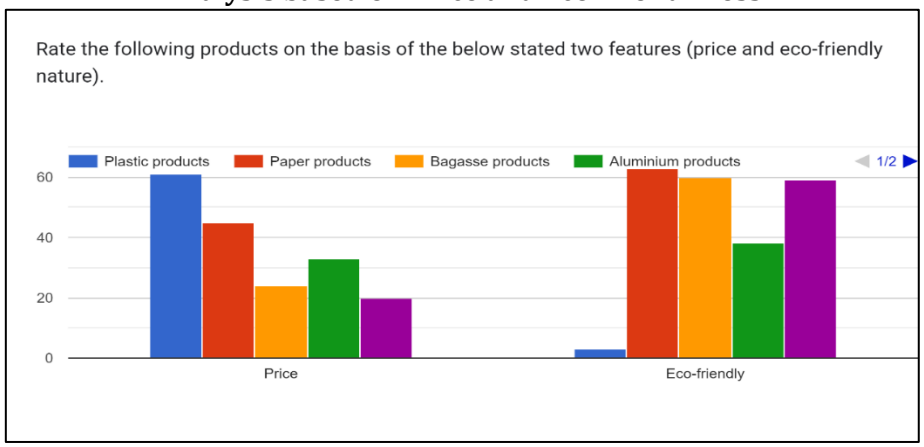
Observation: While most of the people prefer to pay a slightly higher price for a substitute, majority of the people (more than half) have the reason that the substitutes are environment friendly. Around one-fourth of the people are inclined to pay more price because they feel that the substitutes have a better quality as compared to their plastic counterparts. Few people are of the opinion that the look and the feel of the substitutes is the driving factor for paying more. A very small percentage of people have the reason that since plastic is no longer available, they will pay more

On the basis of features of the Container



Observation: While one-fifth of people think that none of the qualities stated is difficult to replicate in the substitutes, the other majority choose 'durability' and 'negligible chances of leakage' to be the features which are difficult to replicate. 'Stain resistance' comes lower on the list. This is also an indication that these reasons are something which the consumer looks for in the disposables.

Analysis based on Price and Eco-friendliness



Observation: On the price parameter, the maximum votes go to plastic products. Most people in the sample believe that plastic products are best priced out of the four. Next, it is followed by paper products. Thus, plastic and paper products are believed to be better priced than the other two. The perception trend can be seen as - the better the recyclable nature of the product, more is the price.

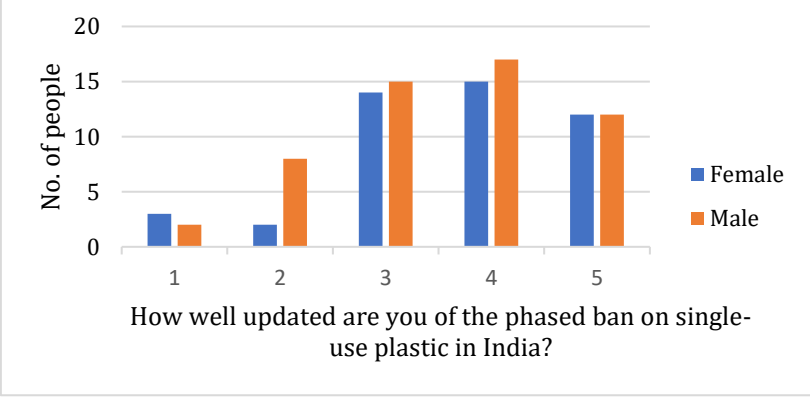
With respect to eco-friendliness, paper products, bagasse products and rice husk products are the top choices. Plastic and aluminium products are not considered the top in terms of their eco-friendly nature.

9 INFERENTIAL ANALYSIS

Pivot Tables

Analysis of Awareness

Column Labels			
Row Labels	**Female**	**Male**	**Grand Total**
1	3	2	5
2	2	8	10
3	14	15	29
4	15	17	32
5	12	12	24
Grand Total	**46**	**54**	**100**

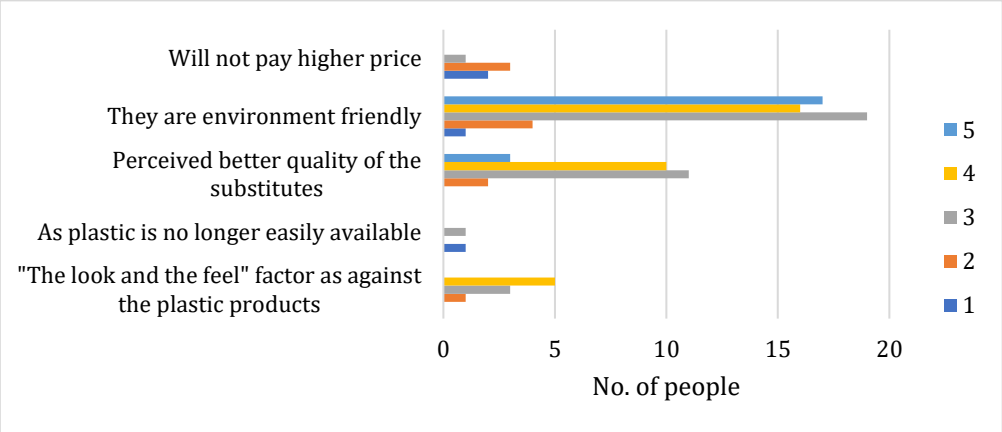


Observation: It can be seen that while some people are still unaware of the ban imposed by the Indian government, all the other people are either neutral or fairly updated about the same. The graph shows data

which is gender specific. An almost equal number is visible for options 1, 3, 4 and 5. While for 2, we can see that the male graph is shooting higher.

Analysis of willingness to pay more and the reasons associated with it

Count	Willing to pay more					
Row Labels	**1**	**2**	**3**	**4**	**5**	**Grand Total**
The look and the feel factor as against the plastic products		1	3	5		9
As plastic is no longer easily available	1		1			2
Perceived better quality of the substitutes		2	11	10	3	26
They are environmentally friendly	1	4	19	16	17	57
Will not pay a higher price	2	3	1			6
Grand Total	**4**	**10**	**35**	**31**	**20**	**100**



Observation: The pivot table shows that the majority lies on the right-hand side of the conundrum, which means that the maximum number of people have chosen options 3, 4 and 5, which shows that they are more likely to pay a marginally higher price for the substitute. Further, if we notice, we can see that 58 votes have been allocated to the reason. They are environmentally friendly. Second is the reason 'Perceived better quality of the substitutes. This shows the behaviour of the consumer towards the adoption of substitutes.

Chi-square test (Independence of variables)
Test 1

H_0: Null Hypothesis: Plastic substitutes used before do not affect the decision of the most preferred substitute by the consumer.

H_1: Alternative Hypothesis: Plastic substitutes used before affect the decision of the most preferred substitute by the consumer.

Test Statistics

Chi-square (Observed value)	71.781
Chi-square (Critical value)	47.400
DF	33
p-value	0.0001
Alpha	0.05

Result: As the P value is < 0.05, we have sufficient evidence to reject the null hypothesis at 95 % confidence

level. The alternative hypothesis that early usage of plastic substitutes affects the decision of the most preferred substitute is accepted.

Test 2

H_0: Null Hypothesis: How well people are updated with the ban does not affect how likely they are to pay a marginally higher price for the substitute.

H_1: Alternative Hypothesis: How well people are updated with the ban affects how likely they are to pay a marginally higher price for the substitute

Test Statistics

Chi-square (Observed value)	28.412
Chi-square (Critical value)	26.296
DF	16
p-value	**0.028**
alpha	0.05

Result: As the P value is < 0.05, we have sufficient evidence to reject the null hypothesis at the 95% confidence level. The alternative hypothesis is that people well updated with the ban affect how likely they are to pay a marginally higher price for the substitute.

A comparative evaluation of the major substitutes indicates that paper and bagasse products currently offer the most balanced combination of sustainability, consumer acceptance, and market availability. Aluminium products provide superior durability and heat resistance but face limitations in terms of environmental perception. Rice husk products possess strong environmental potential; however, lower awareness and limited market penetration continue to restrict large-scale adoption.

10 COMPARATIVE ANALYSIS OF SUBSTITUTES

Parameter	Paper	Bagasse	Aluminium	Rice Husk	Plastic
Cost	Low	Medium	Medium	High	Low
Biodegradability	High	High	Low	High	Low
Durability	Medium	High	High	Medium	High
Heat Resistance	Medium	High	High	High	Medium
Consumer Acceptance	High	High	Medium	Low	High
Market Availability	High	Medium	High	Low	High

The following findings have been arrived at after the analysis -

- *Consumers' Perception:* Various analysis shown above proves that the sample shows a skewness with respect to a positive inclination towards an environmentally friendly alternative. Inferential analysis (2) shows that the majority of the people sampled are willing to pay a marginally higher price to move to a more environmentally conscious alternative.
- *Market for the substitutes*: From the above finding, we can see that there exists a potential market for the substitutes. If we derive results from descriptive analysis (8), we can see that the highest preferred substitutes are paper products and bagasse. The market for the stated two can be seen growing in the near future. The products have gained popularity and to date, awareness of them remains positive. For rice husk products, the product lacks awareness, as very few people have used it. But for some who have used it before, prefer rice husk due to its 100% biodegradable raw materials. Thus, for rice husk, we can say that the market is expected to grow at a slow pace for now until more awareness is spread for the same, but for bagasse and paper products, the market can be seen making space for them.

- *Awareness:* The sample can be concluded to be fairly updated on the major areas related to the disposables. The behemoth of this market - plastic products faced a shakedown after the ban, about which there is a fair knowledge. Additionally, the knowledge that hot servings in a plastic container are reasons enough to shift to a better alternative, which is both safe for the environment and safe for health.
- *Update and Preference:* We can observe that there is a relation between how well updated one is about the health hazards and their preference towards greener substitutes. People better updated are seen to be more inclined towards environmentally friendly substitutes. In conclusion, the preference changes in accordance with the level of updates.
- *Price and Preference:* We can observe that there is a relation between how well updated one is about the ban and the price they are ready to pay for the substitutes. People better updated are seen to be readily agreeable towards paying more for the substitute.

11 RECOMMENDATIONS

The above project has been very fruitful and enriching. After a proper analysis of the same, the following are the recommendations -

- *Focus on Bagasse and Paper Products*: From the above analysis, it can be concluded that the bagasse and paper disposable industry is growing exponentially. It is wise to streamline the entire focus towards these industries. The phased ban imposed by the government acted as a catalyst in this respect and accelerated the process of the shift away from plastic and towards disposables.
- *Gradual Shift:* It can be observed that even the government has imposed the ban in a phased manner, starting from smaller microns and moving gradually towards higher micron sizes. The adoption process of more environmentally friendly substitutes should be gradual, as if the influence has to be long-lasting, it should be done over a period of time and with full awareness. The market is wholeheartedly accepting paper and bagasse products, but in the case of rice husk, the market penetration is not much. This can be both because of a lack of awareness and a higher price. Hence, the target should be a long-term impact
- *Ban on Plastic:* With reference to the ban imposed on single-use plastic, the government should plan to put further bans on microplastics and plastics of higher microns. This will ensure that certain disposables that still use plastic linings find an alternative, as the ultimate goal is to move towards a more environmentally friendly substitute. Given the fact that other substitutes are putting forth strong competition in pricing, it is worthwhile to consider the ban on the use of plastic as linings.

12 LIMITATIONS OF THE STUDY

However, certain factors that could enhance this study lie beyond the control are -

- The study is limited by the absence of advanced statistical modelling and predictive analytics techniques that could provide deeper insights into consumer behaviour.
- The recommendations suggested are purely based on feasibility studies, practises followed and predictions for the same in the Indian context. The futuristic approach may lead to some differences in reality.

CONCLUSION

The disposable industry is a booming market. Previously, the industry was primarily dominated by plastic products. The Indian economy, being a developing economy, is heavily dependent on plastic as it is cheap and convenient. Recently, after the government imposed a ban on the use of single-use plastic, the market was inundated with newer substitutes. Everyone is looking for ways to find a substitute which perfectly fills the gap created by the ban on plastic. In this quest, bagasse products gained momentum in a short period. For paper products, it can be noticed that though it was popular in the market for a long time, the growth rate has increased recently.

Aluminium products have a level of importance among customers. With regard to rice husk, the product lacks market penetration. The consumer is spoilt for choice.

Moreover, it can be concluded that there has been a shift in the consumer due to better awareness. More and more people are getting to know about the health hazards of hot consumables in a plastic container and, for that matter, even in aluminium containers. The analysis of the data has resulted in valuable conclusions about the topic. Two perceptible relations between two different parameters. It can be derived that the more aware the consumer is, the more likely a marginally higher price has to be paid. Thus, we can conclude that investment of time and resources in the environment friendly substitute is likely to be a good decision. The analysis concludes the demand and willingness for the products. The supply side of it has to be done efficiently and effectively.

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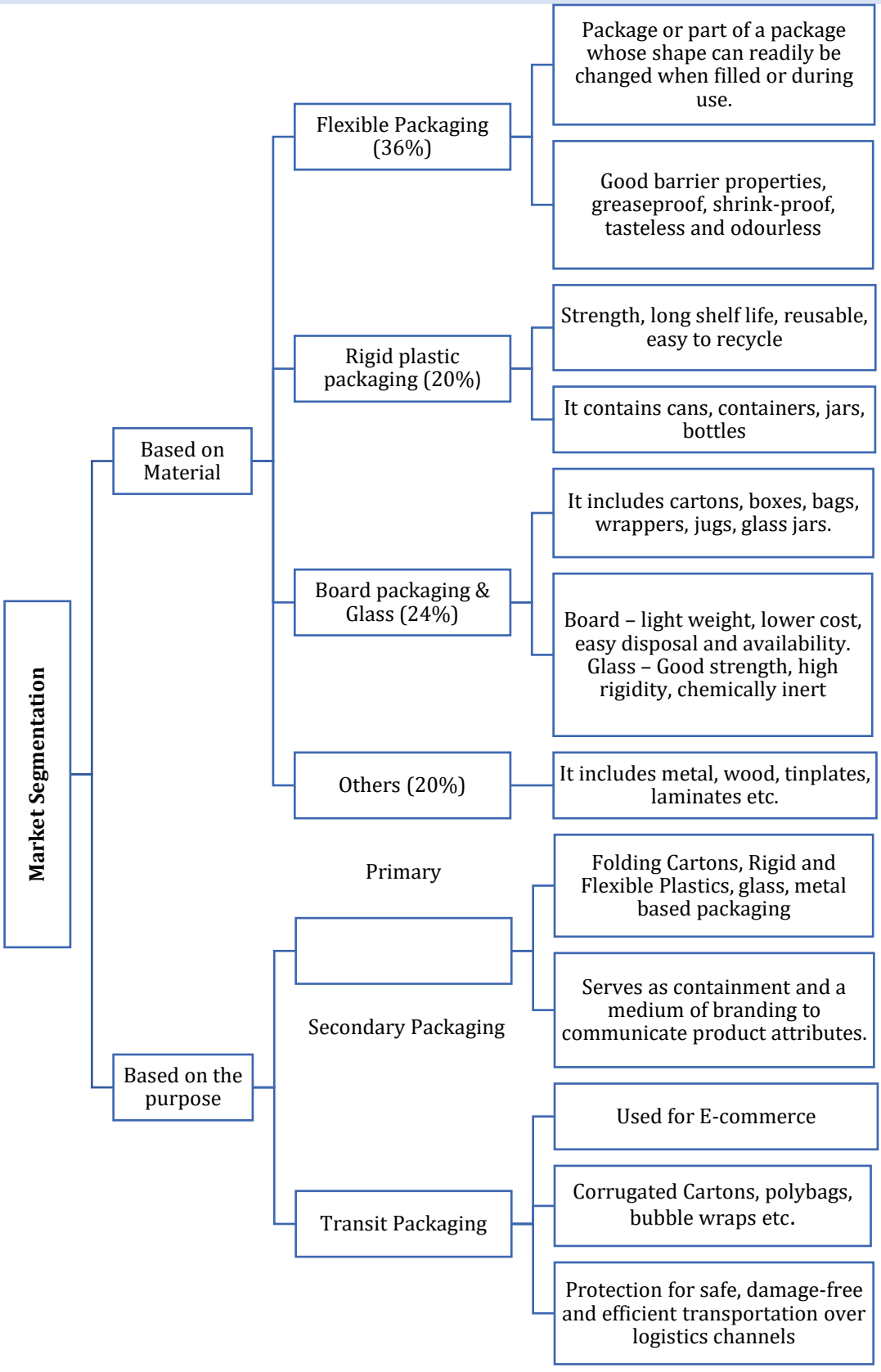
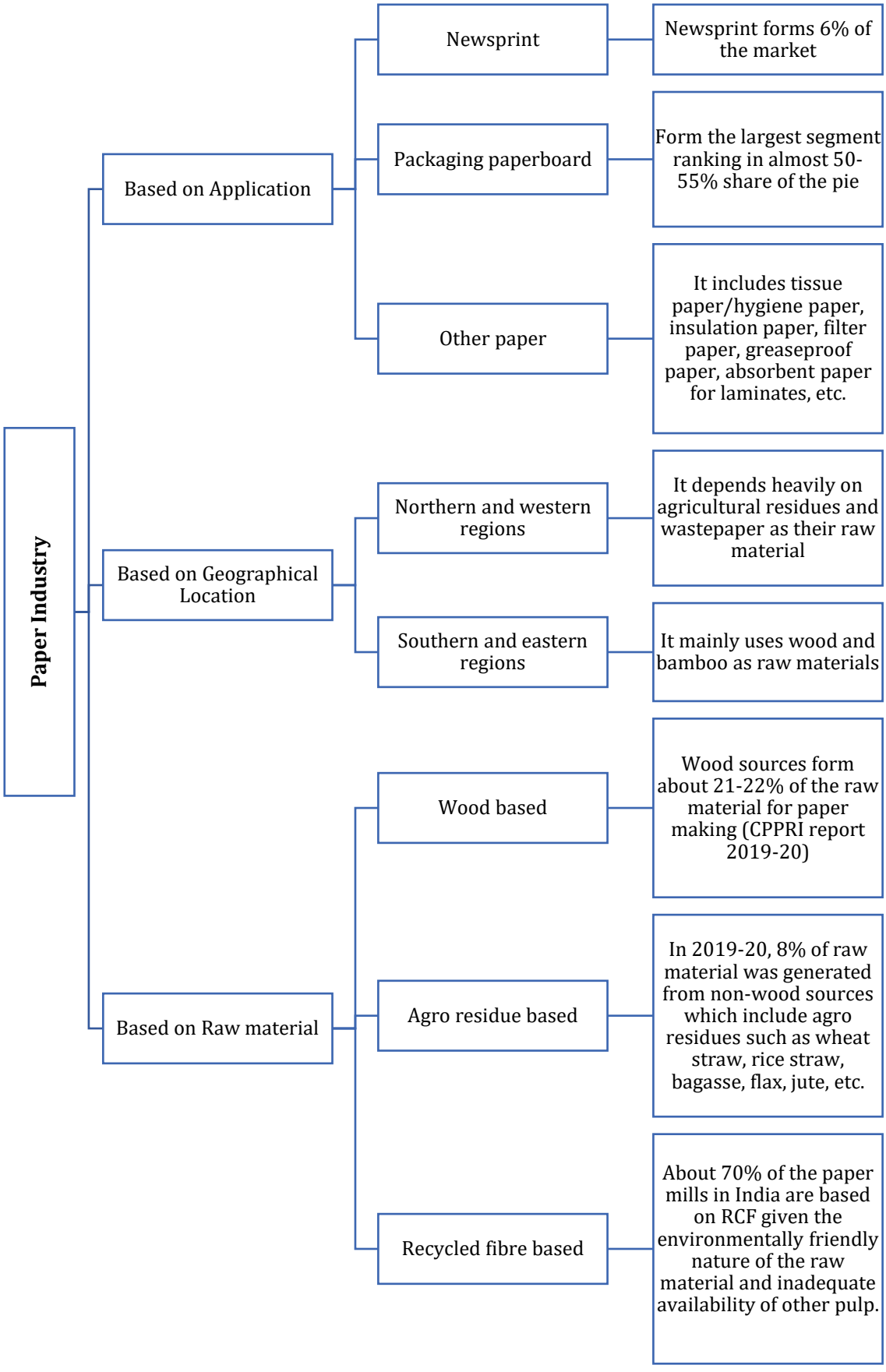
ANNEXURE 1


Market Segmentation
Based on Material
Based on the purpose
Flexible Packaging (36%)
Package or part of a package whose shape can readily be changed when filled or during use.
Good barrier properties, greaseproof, shrink-proof, tasteless and odourless
Rigid plastic packaging (20%)
Strength, long shelf life, reusable, easy to recycle
It contains cans, containers, jars, bottles
Board packaging & Glass (24%)
It includes cartons, boxes, bags, wrappers, jugs, glass jars.
Board – light weight, lower cost, easy disposal and availability. Glass – Good strength, high rigidity, chemically inert
Others (20%)
It includes metal, wood, tinplates, laminates etc.
Primary
Folding Cartons, Rigid and Flexible Plastics, glass, metal based packaging
Secondary Packaging
Serves as containment and a medium of branding to communicate product attributes.
Transit Packaging
Used for E-commerce
Corrugated Cartons, polybags, bubble wraps etc.
Protection for safe, damage-free and efficient transportation over logistics channels

ANNEXURE 2


Paper Industry
Based on Application
Newsprint
Newsprint forms 6% of the market
Packaging paperboard
Form the largest segment ranking in almost 50-55% share of the pie
Other paper
It includes tissue paper/hygiene paper, insulation paper, filter paper, greaseproof paper, absorbent paper for laminates, etc.
Based on Geographical Location
Northern and western regions
It depends heavily on agricultural residues and wastepaper as their raw material
Southern and eastern regions
It mainly uses wood and bamboo as raw materials
Based on Raw material
Wood based
Wood sources form about 21-22% of the raw material for paper making (CPPRI report 2019-20)
Agro residue based
In 2019-20, 8% of raw material was generated from non-wood sources which include agro residues such as wheat straw, rice straw, bagasse, flax, jute, etc.
Recycled fibre based
About 70% of the paper mills in India are based on RCF given the environmentally friendly nature of the raw material and inadequate availability of other pulp.