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Exploring the Perspectives of Street Vendors towards adopting the Sustainable alternatives to Single-use Plastic in the Agra City

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ABSTRACT :

Over the past few decades, Plastic Pollution has emerged as one of the most emerging environmental concerns at the global level. India produces **3.5 million metric tonnes of plastic waste** annually, **40% of which is single-use plastic,** which we use just once before throwing it away, according to the **Central Pollution Control Board Report (2019-20).** As the world's capacity to deal with the rapidly increasing output of disposable plastic goods has been exhausted. To address this issue, the Government of India has completely banned Single-use Plastic on **1 July, 2022**. To be effective of this regulation instrument, public behavior plays an important role. The majority of studies focus on how plastic affects the environment, but there is lack of literature on the impact of such regulations on street vendors. This paper reports on study that focused on an assessment of attitude of street vendors towards Sustainable alternatives to single-use plastic and to identify the factors that influence their intentions to use sustainable alternatives. This study completely relies on primary data. For this purpose, survey method has been used to collect the data in various parts of Agra from respondents by using a questionnaire. To find pertinent stakeholders, the study's methodology included the snowball sampling technique. Descriptive data will be analysed using tables and graphs. The findings will provide the insight that will help Government to understand street vendors' perception towards using Biodegradable Plastic after implementing the Ban and formulate such strategies that will increase involvement of street vendors for adopting the sustainable alternatives.

Keywords:- Street Vendors, Biodegradable Plastic , Consumption, Sustainable Alternatives.

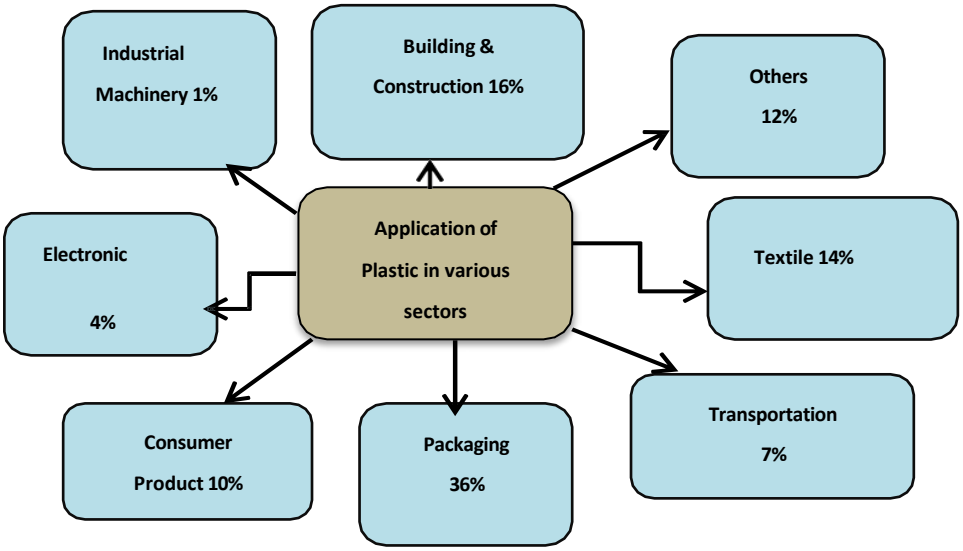
INTRODUCTION

Synthetic Polymers are used to make plastic which are lightweight, strong, durable and inexpensive. Over the past 50 years, they have assimilated into daily life due to these crucial characteristics. The term "plastics" refers to a broad range of synthetic polymeric materials made from fossil hydrocarbons, including low-density polyethylene (LDPE), high-density polyethylene (HDPE), polyvinyl chloride (PVC), polyethylene terephthalate (PET or PETE), polypropylene (PP), and polystyrene (PS), all of which are created to meet the very diverse needs of thousands of end products. Based on their physical characteristics, plastic materials can be divided into a variety of types that are frequently categorized into three main categories: **1) Thermosets, which are rigid plastics that cannot be remelted and reshaped, and 2) Thermoplastics, which can be repeatedly recycled or reshaped into a liquid state. 3) Elastomers, also known as soft elastic plastics.**

Applications of Plastic

The growth of the plastics industry has made it possible to meet the increasing material needs of the global population, but it should be noted that traditional plastic production is still largely dependent on fossil fuels. Plastic is used in almost every industry due to its wide range of applications.

Fig.1. Applications of Plastic



(Source: Geyer, Jam beck and Law, 2017)

1.2. Plastic waste generation in India

Not the amount of waste generated but ineffective waste management, such as improper waste collection and recycling, is the biggest worry with regard to plastic waste in India. Uncollected plastic waste, which makes up 40% of the waste dumped in landfills, clogs waterways and pollutes streets, is the main issue. This uncontrolled plastic waste contributes to the overproduction of plastic, the plastic crisis, and easy access for animals to zoos.
The current priority is gathering, managing, and properly discarding plastic waste. We are all aware that over the past 20 years, there has been an increase in the consumption of plastic due to the growing demand for new goods and technology. We can deduce that only a small portion of plastics are recycled and the remainder all end up in landfills from the fact that 60% of the collected plastic waste is not recycled.

Introduction of sustainable alternatives to Plastic to reduce Plastic use

The Honourable Prime Minister, Shri Narendra Modi, declared the goal of SUP's phase-out by 2022 in his 2019 Independence Day speech. Since then, the Government of India's Ministry of Environment, Forest, and Climate Change has published the Plastic Waste Management (PWM) Amendment Rules, 2021, which ban certain SUP items that have a high potential for littering and low utility by July 1, 2022.
Therefore, in order to combat the SUP issue, a well-thought-out and methodical strategy is required. It will be crucial to make sure that best practices aligned with the 5Rs (redesign, reduce, reuse, recover), a circular economy approach to plastics, are adopted on a national level. In view of this, NITI Aayog established a committee under the leadership of Hon'ble Member Dr. V.K. Saraswat to find plastic alternatives as well as technologies that make plastics biodegradable.

Overview of Biodegradable Plastic

Nowadays, consumers are becoming more conscious of the negative effects plastics have on the environment. Therefore, bio-based and biodegradable polymeric materials are one of the best ways to realize because they can be sustained and handled in the global environment. Additionally, a number of policymakers have developed initiatives to support the development of bio-based plastics. In order to achieve this sustainable growth of the plastic industry and to offer a potent substitute for petrochemical plastics in the near future, biodegradable plastic can be seen as one of the alternatives.

Fig.2. Types of Biodegradable plastic

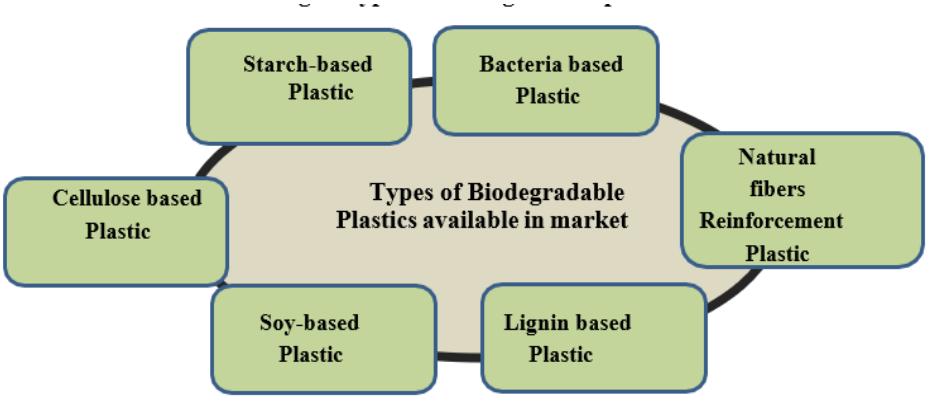


Table.1. Sustainable Alternatives of Single-use Plastic

S No.	Non Degradable Plastic	Sustainable Alternatives of Plastic
1.	Plastic Straw	Stainless steel straw, Bamboo straw, Silicon straw, compostable plant based straw
2.	Plastic packaging	Seaweed pouches, rice straw and fruit peel made packets
3.	Plastic cutlery	Bamboo utensils, leaf cutlery, mason jar
4.	Plastic containers	Stainless steel lunch box, reusable containers
5.	Plastic plates	Palm leaf, Bamboo pulp plate, porcelain plates
6.	Bags	Canvas, khadi, jute, cloth

Source :-(By own researcher)

METHODS

Having in mind the purpose of this study to investigate usage pattern of street vendors in city of Taj as well as efforts to know the impact of Government actions on alternatives consumption.

RQ1: What is influence of the demographic characteristics of street vendors on eco- responsible behavior towards sustainable alternatives?

RQ2: Which is the best between plastic and its sustainable alternatives in terms of availability, mechanical strength, quality and cost?

RQ3: Which government action is most effective to reduce plastic consumption according to vendors?

This research questions were assessed through questionnaire survey, using an appropriate instrument for data collection.

Therefore, survey was developed to ascertain street vendors' perceptions of sustainable alternatives to plastic, specifically biodegradable plastic, starting with the research question, "To what extent are street vendors using alternatives to plastic, and how aware are they of Biodegradable plastic types."

Questionnaire Survey

In order to check the effectiveness of the approach used, the list of questions was prepared by the author. The final version ended up with 15 questions, divided into different sections.

This study attempted to determine the impact of the sample's demographic profile on the adoption of sustainable plastic substitutes by distributing a questionnaire to 100 street vendors. The sampling procedure used the snowball sampling approach. Data collection involved direct observation of street vendors. Strict ethical guidelines were followed in the design of the questionnaire and the data collection. Each participant could access the questionnaire only after indicating their informed consent and willingness to take part in the study.

Quantitative survey was developed that measured agreement and uncertainty using a series of statements and a 5-point Likert scale (1 strongly disagree, 2 disagree, 3 neither disagree nor agree, 4 agree, and 5 strongly disagree), where "Strongly agree and agree" denotes high motivation and "Neither agree nor disagree" denotes uncertainty.

A specially designed questionnaire for this paper was used to conduct the survey. The questionnaire had six sections with questions to gather information for a variety of purposes: **(1)** Demographic variables (age, gender, education) of respondents; **(2)** Buying habits; **(3)** opinion about sustainable alternatives to plastic; **(4)** willingness to pay for alternatives; **(5)** assessment of biodegradable plastic in comparison to plastic **(6)** measure actions that undertook by Government.

Furthermore, the last section of the survey instrument attempted to address some of the unanswered questions regarding how to resolve the issues that street vendors encounter when using biodegradable plastic and how to reduce plastic consumption.

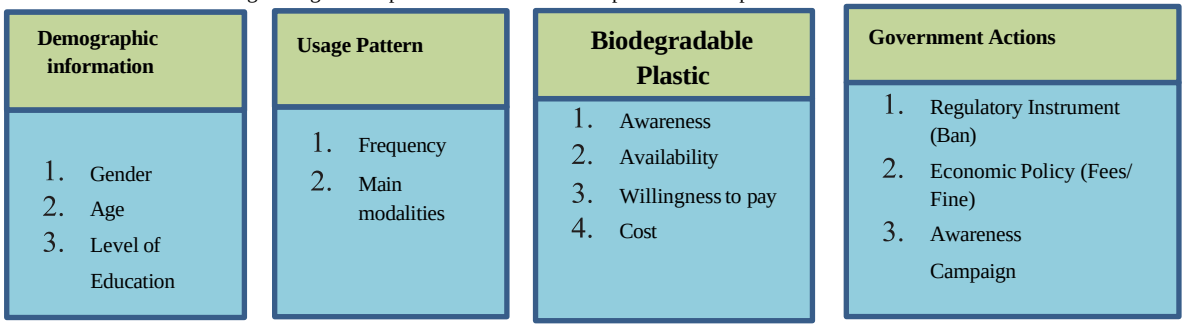


Fig.3. Summary of each survey section and covered topics

Data Analysis

The data analysis was completed by using **SPSS version 29**. In order to provide background knowledge for future research, this study has been completed. Therefore, the significance of differences between some categorical variables, such as age, education and gender were assessed using the **Crosstab and Chi-square tests**. To ascertain the relationship between demographic factors and street vendors' attitudes towards the use of sustainable alternatives to single-use plastic. **Cramer's V coefficient** value allowed for an analysis of the degree of relationship between the variables. The range of this coefficient is 0 to 1.

The responses to "How willing would you be to pay more in order to consume sustainable alternatives of plastic?" and "How often do you use sustainable alternatives to plastic?" were coded on **5-point Likert scale**. To identify best between plastic and its sustainable alternatives in terms of availability, mechanical strength, quality and cost, data was analysed using descriptive statistics, with **frequency tables, measure of central tendency and dispersion**.

The vendors' perceptions towards government's efforts to reduce the use of plastic were ascertained using **Percentage analysis**. To which extent, these are effective.is a question.

RESULT & DISCUSSION

As stated earlier, plastic is used all over the world, of the 100 street vendors of survey, the majority of respondents still use single-use plastic in spite of being banned. The most frequently used modality among those surveyed was plastic packaging (40%) followed by plastic bags (32%) and cutlery (28%). Additionally, they discussed their issue, which is that the customer is unwilling to pay more for these alternatives.

- **RQ1: What is influence of the demographic characteristics of street vendors on eco- responsible behavior towards sustainable alternatives?**

In this study, researcher has tried to determine the significance of differences between demographic characteristics of street vendors on eco-responsible behavior. The level of engagement towards eco-responsible behavior appears to be significantly influenced by factors like gender, age, and educational background.

Table.2. Demographic characteristics of the sample (n= 100)

Variable	Group	N
Gender	Male	69
	Female	31
Age	18-30 years	60
	30-40 years	16
	40-50 years	-
	50+ years	24
Education level	Uneducated	22
	Upto 10^{th} class	31
	12^{th} Pass	7
	Graduate	40

Table.3. Association between demographic variables and attitude towards using sustainable alternatives to Single-use plastic

	Gender		**Age**			**Education level**			
Attitudes	**Male**	**Female**	**18-30 years**	**30-40 Years**	**50+ years**	**Uneducated**	**Up to 10^{th} class**	**12^{th} pass**	**Graduated**
How often do you use sustainable alternatives									
Never	33.3%	-	25%	50%	-	68.2%	-	-	20%
Rarely	11.6%	-48.4%	13.3%	-	-	-	25.8%	-100%	-
Sometimes	43.5%	25.8%	48.4%	-	66.7%	31.8%	48.4%	-	40%
Often	11.6%	25.8%	13.3%	-	33.3%	-	-	-	40%
Always	-		-	50%	-	-	25.8%		-
p-value	**<.001**		**<.001**			**<.001**			
Cramer's coefficient, V	**0.588**		**0.613**			**0.559**			

How willing would you be pay more in order to consume biodegradable plastic?									
Not at all	34.8%	22.6%	51.6%	-	-	36.4%	25.8%	100%	20%
Slightly	-11.6%	-	-	-	-	-	-	-	-
Moderately	31.9%	-25.8%	-	50%	-	-	-48.4%	-	20%
Very	21.7%	51.6%	36.7%	-	33.3%	31.8%	25.8%	-	20%
Extremely			11.7%	50%	66.7%	31.8%		-	40%
p-value	**.011**		**<.001**			**.007**			
Cramer's coefficient	**0.332**		**0.661**			**0.343**			

What is awareness level of Street vendors regarding Biodegradable Plastic?									
Very unaware	-	-	-	-	-	-	-	-	-
Unaware	11.6%	-	13.3%	-	-	36.4%	-	-	-
Neutral Aware	-	-48.4%	-	-	-33.3%	-	-48.4%	-100%	-
Strongly aware	31.9%	51.6%	48.4%	-100%	66.7%	31.8%	51.6%	-	20%
	56.5%		38.3%			31.8%			80%
p-value	**.072**		**<.001**			**<.001**			
Cramer's coefficient, V	**0.229**		**0.339**			**0.504**			

Chi-square test p-value at a level of significance of 5%

Table.3. presents a cross-tabulation of demographic variables measuring street vendors' attitudes towards environmentally friendly plastic substitutes. When it came to the participant's purchasing habits for biodegradable plastic, there were significant differences between the groups for gender, age and education **(p-values of <.001 in all cases)**; associations were strong in all cases **(V= 0.588, V= 0.613, and V= 0.559)**. The vendors who tried to purchase biodegradable plastic were women with graduation and whose age is 30-40 years.

Concerning the willingness of vendors to pay more in order to consume biodegradable plastic, significant difference were found between groups for gender, age and education **(p-value of .011, <.001 and <.001, respectively),** with moderate association **(V= 0.332, V= 0.661, V= 0.343)**. Willingness to pay extra for alternatives increased with age and females are more willing to pay extra who are graduates.

The level of awareness regarding biodegradable plastic among street vendors is higher for graduate who belong to 30-40 years age category, with significant difference between groups for age and education **(p = <.001 in both cases)**. However, the association in first case is moderate **(V= 0.339)** and for second case, is strong **(V= 0.504)**.

- **RQ2: Which is the best between plastic and its sustainable alternatives in terms of availability, mechanical strength, quality and cost?**

Table.4. Perception of street vendors towards biodegradable plastic

S No.	**Items**	**Strongly Disagree (1)**	**Disagr ee (2)**	**Neutral (3)**	**Agree (4)**	**Strongly Agree (5)**
1.	Is biodegradable plastic costlier than regular plastic?	**-**	**08**	**08**	**35**	**49**
2.	Is biodegradable plastic easily available in market?	**-**	**18**	**09**	**27**	**46**
3.	Is biodegradable plastic better as compare to non-degradable plastic?	**24**	**-**	**07**	**15**	**54**
4.	Is mechanical strength of biodegradable plastic good than plastic?	**62**	**23**	**-**	**-**	**15**

The 5- point Likert scale is considered an interval scale. The mean is very significant. From 1 to 1.8, it means strongly disagree, from 1.81 to 2.60, it means disagree, from 2.61 to 3.40, it means neutral, from 3.41 to 4.20, it means agree, from 4.21 to 5, it means strongly agree. **(Pimentel, 2010)**

Table.5. the ranked means of perception of street vendors towards biodegradable plastic in reference of availability, mechanical strength, quality and cost

Descriptive Statistics				
	N	**Sum**	**Mean**	**Std. Deviation**
Is Biodegradable Plastic costlier than regular Plastic?	100	425.00	**4.2500**	**.91425**
Is Biodegradable Plastic easily available in market?	100	401.00	**4.0100**	**1.13258**
Is Biodegradable plastic better as compare to regular Plastic?	100	375.00	**3.7500**	**1.65374**
Is mechanical strength of Biodegradable Plastic good than regular plastic?	100	183.00	**1.8300**	**1.40025**
Valid N (list wise)	100			

After calculating the mean and standard deviation, **Mean was ranked in descending order** as per its value. The highest ranked mean value across all parameters, **4.25**, indicates that cost plays a significant role in the decision to switch to sustainable alternatives. After the cost, its availability and mechanical strength of biodegradable plastic influence the perception of street vendors.

Most of the respondents is strongly agree with this statement that Biodegradable plastic is costlier than regular plastic, **(Mean value= 4.25)**. To assess the mechanical strength of biodegradable plastic for each participant, computed as the mean value, which is **1.83**, it shows that majority of vendors are disagree with its good mechanical strength of alternatives. Concerning about availability of biodegradable plastic with **(Mean value = 4.01)**, stated that vendors concur that it is readily available in market.

- **RQ3: Which government action is most effective to reduce plastic consumption according to vendors?**

Table.6. Evaluation of Awareness campaign run by government

Is awareness campaign assisting to reduce plastic consumption?		
	Frequency	**Percent**
Yes	-	-
No	100	100%
Total	**100**	**100%**

For evaluating the awareness campaign run by Government, street vendors' perception was explored. As per their opinion, awareness campaign is completely failed to reduce plastic consumption.

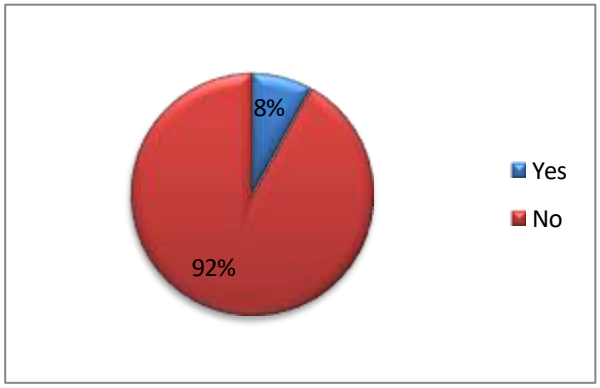


Fig.4. Is Economic policy (Fees/ Fine)

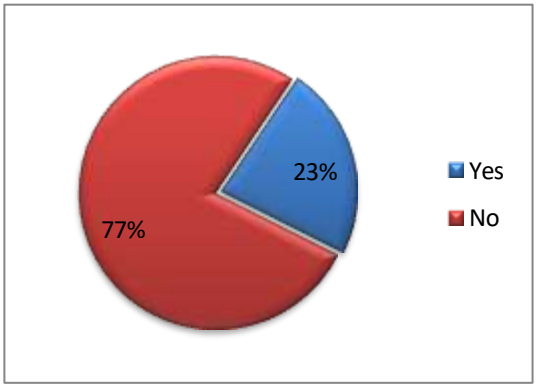


Fig.5. Is regulatory instrument assisting to assisting to reduce Plastic consumption? reduce plastic consumption?

According to the data in **Fig. 4,** only **8%** of vendors agreed with the economic policy of levying fines, and **92% of vendors** believe that economic policy related to fining people for using plastic will not reduce plastic consumption.

Figure.5 shows the results of the researcher's efforts to assess regulatory instruments from the viewpoint of vendors. **77%** of respondents expressed the opinion that, in addition to creating a circular economy, other government initiatives must be introduced while keeping the welfare of the general public in mind. Full or partial bans are not helping to reduce plastic consumption.

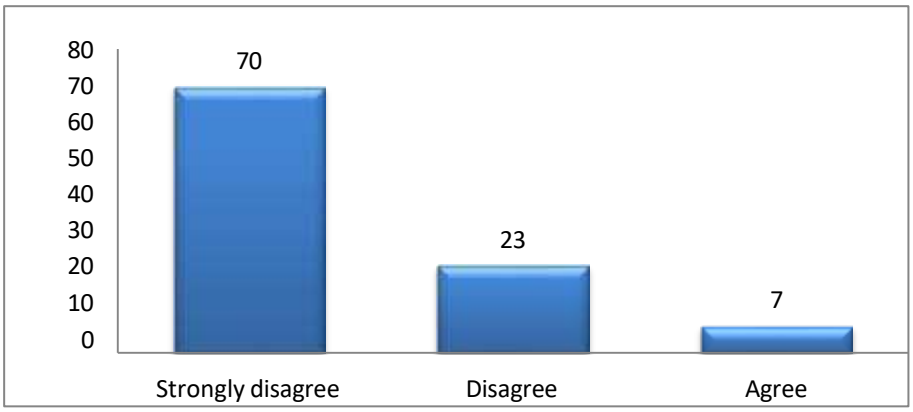


Fig.6. Is single-use plastic ban effective in reducing Plastic consumption

The research instrument also paid a special attention to the subject matter of single-use plastic ban. Based on data collected by survey, majority of the respondents **(70%) is strongly disagree** with outcome of single-use plastic ban. **23% belong to disagree category and 7% of vendors are agree** (Single use plastic ban is good initiative to transition to sustainable alternatives).

CONCLUSION

This paper evaluated the attitude and perception of street vendors on the use of sustainable alternatives to plastic, associating them with their demographic variables. Evidence collected from the study suggest that the most respondents demonstrated both a) awareness of the issue during the transition to a circular economy and b) an interest to be engaged in reducing the use of plastic and adopting the sustainable alternatives.

Regarding RQ1, it was observed that vendors have a good knowledge of biodegradable plastic. This feature stand out in participants with higher educational level and also significant with age group and their willingness to pay more for sustainable alternatives is mainly getting affected by consumer's willingness. Accordingly, they will only permit themselves when the customer is
willing to accept the burden of additional payment. Age, gender, and educational groups were found to have significant differences in willingness to pay more. Females are more likely to use biodegradable plastic.

Concerning RQ2, it was concluded that biodegradable plastic is too costly than regular plastic, this feature restrict the vendors to adopt the alternatives. Here, availability is not the issue; rather, vendors are frequently having issues with the product's mechanical strength and are receiving numerous customer complaints about its inadequate capacity. There is requirement to work on its mechanical strength and by increasing production capacity and utilizing the minimum resources, reduction in cost is possible.

Concerning RQ3, the survey also reveals that these problems suggest the need for information campaigns that warn the users about the damages caused by consumption of plastic products. However, this may not be enough. After analyzing the data, it was found that regulatory instrument (Single-use plastic ban) is completely failed, in spite of implementing this ban, plastic use is steadily rising. To prevent the vendors for using plastic in distribution, Charging the fine also not a good strategy, because it exploit the vendors economically, does not actually stop them from using plastic.

Suggestions

In this study, after knowing the street vendors 'perspectives towards sustainable alternatives to plastic, some suggestions have been given by respondents to resolve their problems-

1. Firstly, Plastic factory should be shut down. To decrease the demand of plastic, plastic production should be stopped.
2. Some cost effective alternatives should be introduced by government and mechanical strength test should be performed to determine maximum load.
3. Subsidy should be offered to encourage the use of biodegradable plastic.
4. As per their opinion, Customers need to alter their behavior because they don't bring their own bags, rather demand for separate bag to each item. Vendors suffer a serious setback as a result.

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