

Research Article

Assessing the Effectiveness of the Plastic Ban in the City of Bangalore in Addressing the Market Failure Associated with It

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Abstract

The Bruhat Bengaluru Mahanagara Palike Solid Waste Management (BBMP-SWM) Bye-laws, 2019 was passed by the BBMP in 2019 to ensure proper waste management in the city alongside new rules on the consumption of plastic. According to the Karnataka state plastic board, every citizen, on an average, consumes 16kgs of plastic every month. The extended essay aims towards answering the question “To what extent has the Bruhat Bengaluru Mahanagara Palike Solid Waste Management (BBMP-SWM) Bye-laws, 2019 helped in reducing the negative externalities caused by the overconsumption of single-use plastic.” This study will be examining the effects of this law on the production and consumption of single-use plastics. Through this policy, the BBMP aims to revise the 2016 Karnataka State plastic Ban and enforce it in a stricter manner. This topic is significant as an estimated 20% of the 4000-tonne waste produced by the city consists of plastic. Plastics are not biodegradable, which increases pollution. Through this ban, the Bruhat Bengaluru Mahanagara Palike aims to reduce the external cost caused by reducing plastic consumption. Even if the plastic is marked as “recyclable” over 90% of the plastic is never actually recycled. India has been generating over 3.5 million tonnes of plastic every year. In 2017, plastic resulted in over 2.3 million premature deaths in India because of this, India made it onto the top 10 list along with China and The United States. Hence, the topic is of significant investigation. Over the years, there have been a lot of plastic bans implemented by the government. The most recent one is the Central plastic ban of 2021. Single use plastic does not biodegrade, it breaks down into smaller microplastics which continue polluting the environment.

Keywords

Negative Externalities of Consumption, External Costs, Demerit Good, Marginal Social Benefit, Marginal Private Benefit

1. Introduction: 2019 BBMP Plastic

The state of Karnataka was one of the very first states in India to have introduced a state wide single use plastic ban. In 2016, the state of Karnataka has banned the use of plastic that was less than 40 micrometres thick. [7] Manufacturers in the country were banned from storing and transporting plas-

tic materials to look after the wellbeing of the residents of the country. Several manufacturing units had been raided but the street vendors and small shop owners continued to use plastics. This ban had largely failed because of the lack of awareness among the producers and the consumers along with

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the street vendors. India has been generating over 3.5 million tonnes of plastic every year. In 2017, plastic resulted in over 2.3 million premature deaths in India because of this, India made it onto the top 10 list along with China and The United States. [10] Because of the failure of this ban, the BBMP imposed another plastic ban in 2019 in attempts to reign the excessive use of plastic commodities in Bangalore. [4] The officials have claimed to come up with a better and more comprehensible plan towards achieving low plastic consumption.

2. Methodology

I have used my primary and secondary data to test to what extent the Bruhat Bengaluru Mahanagara Palike Solid Waste Management (BBMP-SWM) Bye-laws, 2019 [17] helped in reducing the negative externalities caused by the overconsumption of single-use plastic. [8] For the collection of primary data, I have used sampling to find my data with a sample size of 125 people. For my survey, I have created a questionnaire filled with a few questions that were answered by the current citizens of Bangalore city using purposive sampling. I have enquired the respondents if they noticed a change after the ban of the government and to what extent were they affected by this plastic ban.

In order to explain the program using secondary data, I have used various newspaper articles, official government documents regarding the ban, the Karnataka state pollution board, and websites as I believe this would increase the relevance and accuracy of my research.

3. Theoretical Framework

3.1. Market Failure and Externalities

Negative consumption externalities arise during consumption and result in a situation where the social cost of consuming the good or service is more than the private benefit. There is a harmful impact on a third party who is not consuming the product. Negative externalities are usually associated with demerit goods. The overconsumption of these demerit goods usually causes a negative impact on a party or individual who is not involved in the decision or action that created it. In this case, the overconsumption of plastic causes harmful negative impacts to the environment in both the short run and the long run such as pollution, litter, plastic related deaths, and harm to wildlife in the area. [12]

Plastic is a demerit good. These goods are socially undesirable. Demerit goods are usually overconsumed in the market. This gives rise to an external cost which is not borne by the consumers, but the society. This could mean that the citizens of Bangalore are not aware of the possible consequences of consumption of plastic. [11]

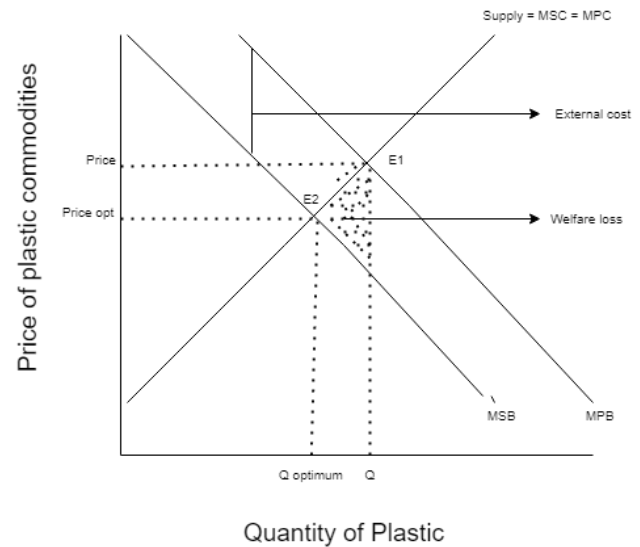


Figure 1. Shows the market for plastic.

Under the assumption that no externalities arise from the production of plastic commodities, we can see that the consumption of plastic is at Quantity Q. This overconsumption essentially means that the consumption of the commodity is higher than what is socially optimum. In this case, the socially optimum quantity of plastic is at Q optimum. The marginal social benefit of consuming plastic commodities is lesser than the marginal private benefit, which means that the consumer who uses this plastic is more likely to enjoy the benefits of using this commodity than that society. Because the Marginal private benefit is larger than the marginal social benefit, we can state that there is a negative externality associated with the consumption of plastic commodities. Since the Optimum quantity of plastics in the market is lower than the quantity that is currently being consumed, there is an overallocation of resources. The society will be better off if the quantity of plastic consumed is at Q optimum as it reduces the welfare loss and the external cost. This external cost or welfare loss, is denoted by the shaded area in the diagram. These external costs could be costs taken to clean the landfills, costs of medication for illnesses and complications relating to plastic. Moreover, there are more intangible costs such as a fall in the quality of life due to land pollution, and complications due to consumptions of microplastics. The resources used to pay for the external costs could have been used for the consumption of a merit good instead, which gives rise to an opportunity cost. The resources used to create the merit goods have now been used to create a good with negative externalities such as plastic related complications and pollution associated with it. Since there is an over allocation of resources, we can conclude that there is a market failure.

4. The 2019 Single Use Plastic Ban

As the 2016 ban on plastic had been circumvented by the

producers and the consumers, The BBMP imposed a single use plastic ban through the BBMP SWM bye-laws on all of the areas under the BBMP limit. On September 1st, 2019, BBMP has banned all of the materials that come under the umbrella term “Single use plastic.”

This single use plastic ban was imposed such that the consumption of plastic in the city reduces. BBMP had extended the ban and fixed penalties on not only those who manufactured and supplied plastic, but also those who were storing or transporting these plastic goods. This caused the citizens of Bangalore to witness a fall in the supply of single use plastic goods. A majority of the single use plastic commodities were plastic bags, plastic cups and plastic cutlery.

Due to the penalties on the supply of plastic, the producers and the manufacturers of single use plastic commodities naturally feel, which caused a fall in the supply of plastic commodities because of the plastic ban.

In the diagram above, we see that there is a leftward shift in the supply curve due to the imposition of the plastic ban. Several manufacturing units have been shut down and the producers have been fined if found with possession of plastic. Due to this leftward shift, the external costs are reduced and there is a new equilibrium. The plastic commodities are produced at price P_s and the market is now producing a socially optimum output level off Q_{optimum} . The marginal social benefit curve does not meet the new supply curve, but the commodities are still being sold and bought at the socially optimum level. The BBMP has tried to fix the market failure and the external costs that are associated with the consumption of plastic commodities by direct intervention by banning plastic and fining people who have been caught using plastic bags and the producers manufacturing, supplying and storing these bags with the Bye-Laws. [2]

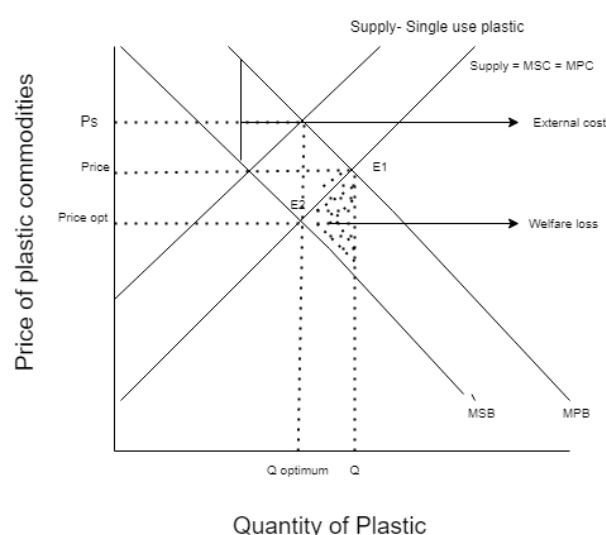


Figure 2. Shows us the market after the single use plastic ban.

Fines

To make sure that the ban is implemented properly, the BBMP had disclosed a “fine system” where anyone who is caught with a plastic bag will be penalized. They would have to pay a sum of 5000 Rs (est \$60 on October 2022) and they would have to pay a sum of 1000 Rs (est \$12 on October 2022) for every subsequent offence. The vendors and producers will be subjected to higher fines. They would be forced to pay a sum of 50,000 Rs for the first time and 100,000 for repeated offences. The BBMP has also threatened to retract their licences for continued offences. [9] These fines are meant to act as a form of nudges for the producers and the consumers. There were several raids organized by the BBMP. [14] About 1.14 crore rs had been collected in the form of fines since September 2019 until July 2022. [15]

5. Analysis

Have you heard about the 2019 ban on single-use plastic bags?

127 responses



Figure 3. Shows whether the citizens have heard about the 2019 ban on plastic.

How did you find out about this ban?

127 responses

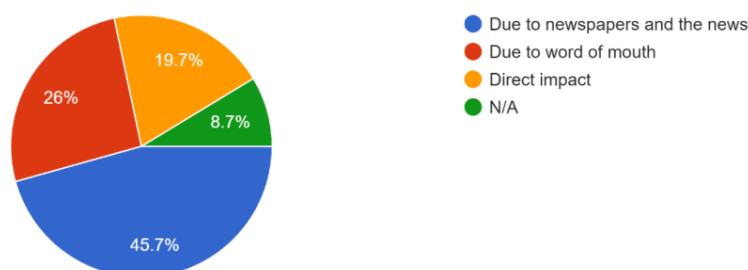


Figure 4. Shows how the citizens found out about the ban.

Out of the people surveyed, a majority of the population (74%) had full information about this ban. However, only about 19.7% of the population had known about this ban because of the direct impact of the ban. Newspaper articles had been a major reason for the awareness about this plastic ban.

5.1. Awareness

Are you aware of the negative effects on the environment due to the use of plastic?

127 responses

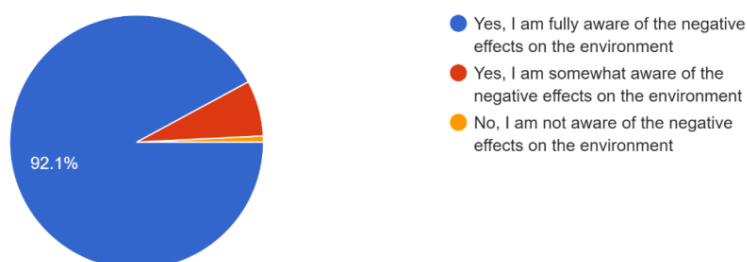


Figure 5. Shows whether or not the citizens were aware of the negative impacts of plastic.

The questionnaire sent out to the residents of Bangalore had several questions relating to the awareness and the amount of knowledge they had about this ban and the negative effects of consumption of plastic. 92% of the respondents are fully

aware of all of the negative impacts of consumption of plastic on the environment. 7% of the population is somewhat aware of the negative effects of the consumption of plastic commodities.

Do you think the government has done a good job in spreading awareness about the negative effects?

127 responses

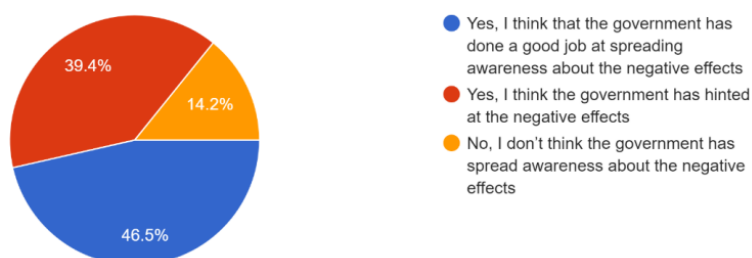


Figure 6. shows whether the citizens think that the government has done a good job in spreading awareness about the negative effects of plastic.

Most of the respondents have agreed that the government has tried to spread awareness about the negative effects of the consumption of plastic and a majority of them applauded the government's efforts towards spreading awareness. The BMTC (Bangalore Metropolitan Transport corporation) has started using the bus's LED boards to display messages such as "stop using plastic" in the state's native language, Kannada,

to ensure that everyone is encouraged to stop using plastic goods. [4] The KSRTC busses also strictly supervised the use of single use plastic bottles and urged the commuters to bring their own bottles. [5] By doing so, the BBMP is reducing the possible asymmetric information by making the consumers aware of the harmful negative externalities.

Are you less likely to use plastic goods now than 4 years ago?
127 responses

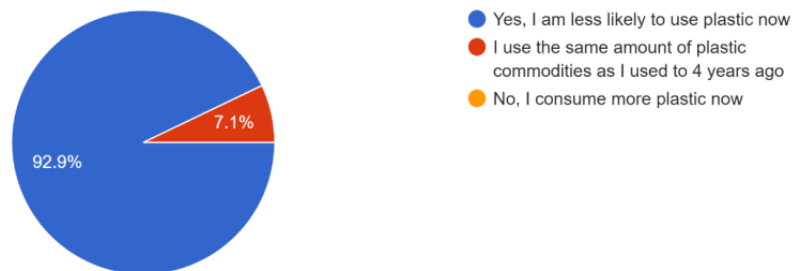


Figure 7. Shows whether the consumers' likelihood of using plastic goods.

Out of the 127 people surveyed, 102 people have refused to use plastic goods when offered to because they had full knowledge of the negative effects of plastic goods and 118 people believe that they are less likely to use plastic commodities now than they used to three years ago. This is due to both the imposition of the ban and the awareness created about the negative effects of the consumption of plastic goods.

BBMP held a 3-day fair from 11th September to 13th September in efforts to educate the citizens of Bangalore about the alternatives to plastic commodities. [3] Around 500-100 people have attended this exhibition which shows the government's efforts to reduce the consumption of plastic commodities by increasing awareness.

5.2. Alternatives

Do you think we have alternatives to plastic
127 responses

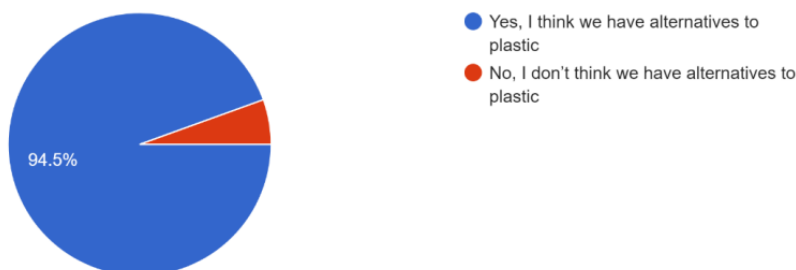


Figure 8. Shows the public opinion on whether or not they think there are alternatives to plastic.

Based on the questionnaire, 94.5% of the people who responded believed that we did have alternatives to plastic commodities. Most of the respondents believed that the government needed to invest in more research to come up with more alternatives to plastic commodities. Plastic bags are a complementary

good to most of the goods sold in the market. Most of the respondents have suggest that the government should invest in and provide subsidies for the manufacturing alternatives to plastic goods which will decrease the cost of production for the manufacturers and the vendors will be able to but the alternatives at a

much lower price. There were two alternatives to plastic bags, compostable plastic bags and paper bags. Compostable plastic

bags were seen to be equally dangerous and several members of the government has called for a ban. [2]

5.3. Impact of the Ban as Felt by Consumers

Have you noticed a decrease in plastic bags because of the 2019 ban?

127 responses

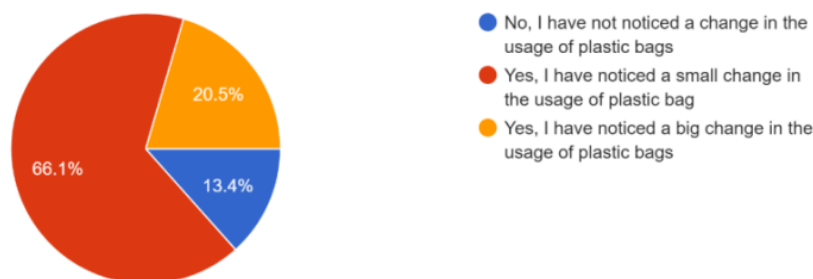


Figure 9. Shows whether or not the citizens have noticed a decrease in the plastic bags due to the ban.

A majority of the consumers believed that there has been a fall in the consumption of plastic bags, a major contributor of pollution and plastic wastes in the city of Bangalore. 66.1% of the people have believed that there has been some extent of a decrease in the consumption of plastic. There have been several exceptions to the 2019 Plastic Ban. For example, water bottles, sachets for milk and bags for IV Fluids. Since not all of the single use plastic commodities had been banned, there has only been a limited decrease in the consumption of plastic commodities.

6. Evaluation

A majority of the consumers believed that there has been a fall in the consumption of plastic bags, a major contributor of pollution and plastic wastes in the city of Bangalore. 66.1% of the people have believed that there has been some extent of a decrease in the consumption of plastic. There have been several exceptions to the 2019 Plastic Ban. For example, water bottles, sachets for milk and bags for IV Fluids. [1] Since not all of the single use plastic commodities had been banned, there has only been a limited decrease in the consumption of plastic commodities.

The plastic processing industry of the country has over 30,000 units and provides employment to over 4 million people. [18] This contributes to roughly 8% of the total GDP of the country. over 1000 single use plastic production units had been shut down due to the imposition of this plastic ban which resulted in a loss of about 350 crore rupees (est. \$42.4million as of October 2022) [19] these is a fall in the real GDP and the real growth rate of the country due to the imposition of this ban due to a fall in the supply of the plastic commodities. Bengaluru is one of the biggest cities in India with a high population. A ban on plastic is bound to reduce the consumption of plastic for several people in the city. Although this ban does look after the

economic wellbeing of the people living in and around the city, it does not account for the jobs lost. The people who had been employed in this job sector have now become unemployed and the government will be required to provide unemployment benefits to these unemployed labourers. The unemployment benefits paid to these unemployed people could have been used to build better infrastructure in the state or it could have been invested in the healthcare system of the state. The consumers are worse off because they now have to find more expensive alternatives for plastic. The producers are also worse off because there is a higher amount of fines imposed on them. The BBMP had collected over 11.4 million rupees as fines. [15] The government is better off as fines are a form of government revenue and this can be used for a merit good. The labourers are worse off as several manufacturing industries were closed down due to the imposition of this plastic ban which led to an increase in unemployment.

In addition to imposing fines and spreading awareness, BBMP has provided the BIAL (Bangalore International Airport Limited) Over 11 tonnes of plastic to pave the roads next to the Kempegowda International Airport. The BIAL also held a plastic drive in effort to collect as much plastic as possible from schools to dispose them in a safer manner. [13] By doing so, The Karnataka government is making efforts towards disposing the plastic commodities and goods in a safe manner. By using the plastic commodities as raw materials, the government will also save a large amount of money which needed to be used for Raw Materials.

The major advantages of the plastic ban are a fall in the consumption of plastic. This ban was imposed to correct the market failure due to the overconsumption of plastic and the ban has strived to do so. The government, through this ban, has looked after the economic well-being of the people of Bangalore by attempting to reduce the consumption of plastic.

This ban gave rise to an increase in the use of alternatives as suggested by both the primary and the secondary data.

These fines imposed by the government are regressive in nature. In the case of consumers, the poorer consumers have to pay a larger portion of their income to the government in the form of fines. With the rise of online shopping, the poorer population of the city is more likely to be found with a plastic bag than the rich or the upper middleclass population of the country. In the case of the producers, the producers would need to cover their cost of production and the fines will further reduce their profits. The smaller businesses would be forced to pay a larger percentage of their profits than larger businesses and this would force them into losses. If it continues, this would drive them out of the market. This would give the bigger businesses a higher market power which could lead to possible monopolies in the market. Despite the fines being the same amount for all of the citizens, the portion of the income paid to the government in the form of taxes varies, which means that there is no equity when it comes to fining because of the plastic ban.

Most of the producers sell commodities in plastic bags due to the low cost of production. [16] When bought in large quantities, plastic bags are much cheaper as compared to the best alternative, paper. The government forcing these producers to come up with alternatives for selling these commodities would lead to a higher cost of production for these producers. The cost of production for some producers might exceed the revenue generated. This would lead to a few firms shutting down which can risk an increase in the market power for bigger firms who will not be affected by a huge margin. The bigger firms have been more likely to make profits than the smaller firms and they are more likely to indulge in research and development which will put them at an advantage against the smaller firms. These smaller firms shutting down will risk the growth of a monopoly in the market. The alternative to plastic bags can also cost the consumers a higher amount of money, which will decrease their purchasing power, leading to lower demand for the good. The ban, however, has given rise to an increase in reusable bags such as Jute and cloth bags. Despite costing much more than plastic bags, these bags are reusable and more durable.

7. Limitations

- 1) This ban was a ban implemented only in the city of Bangalore in a phased manner which made collecting secondary data a hard task.
- 2) The survey was sent through mail and shared through social media which made it difficult to reach people who did not own mobile phones.
- 3) 127 people participated in the survey which might not be an accurate representation of all of the people in the city of Bangalore.
- 4) The coronavirus pandemic started soon after the ban was implemented which caused the citizens to start buying plastic commodities again which led to a change in the number of plastic commodities used.

8. Conclusion

Based on both primary and secondary research conducted over a period of three months, I was able to deduce the impact of the Bruhat Bengaluru Mahanagara Palike Solid Waste Management (BBMP-SWM) Bye-laws, 2019. The imposition of the ban has reduced the number of single use plastic goods in circulation and it will significantly reduce the number of plastic related complications and deaths. The environment has seen a small amount of positive change due to this ban. This plastic ban has reduced the negative impact of the consumption of plastic commodities by a small margin.

Through my research, however, I have found out that this ban has negative effects on the economy in the short run. The country's GDP will face a short term negative economic growth due to the implementation of the ban because of a sudden decrease in the number of plastic goods. [6] This would lead to a loss of jobs, leading to a significant downfall in the economic activity in the state. In the long run, however, the government should invest in more cost-effective alternatives in the country as most of the producers believe that the alternatives cost more money, which will increase the states GDP. Most of the governments possible actions will lead to more harm in the economy than good as some of the actions taken by the government due to this ban will lead to an increase in the income inequality in the state, and the intensive losses incurred by the producers and the consumers in this economy.

The pandemic has also caused an increase in the number of plastic commodities used because of the fear of reusable steel products as this may risk the chances of infection.

The evidence provided by the primary and the secondary data suggests that there has been a small change in the city due to the ban.

9. Further Application

There has been a sudden surge in the number of plastic commodities produced in the country because of its ease of manufacture and lack of regulations in the country during the pandemic. There has been a central ban on plastic commodities because of the recognition of the negative externalities associated with the consumption of plastic. The government can invest more in the production of alternatives to plastic bag as they are essential for the transportation of goods on a smaller scale.

Abbreviations

BBMP	Bruhat Bengaluru Mahanagara Palike
GDP	Gross Domestic Produce
BMTC	Bangalore Metropolitan Transport Corporation
BIAL	Bangalore International Airport Limited
SWM	Solid Waste Management

Author Contributions

Sinchana Rai is the sole author. The author read and approved the final manuscript.

Conflicts of Interest

The authors declare no conflicts of interest

Appendix

1. Survey Question and Results

Have you heard about the 2016 Karnataka Plastic Ban?

127 responses

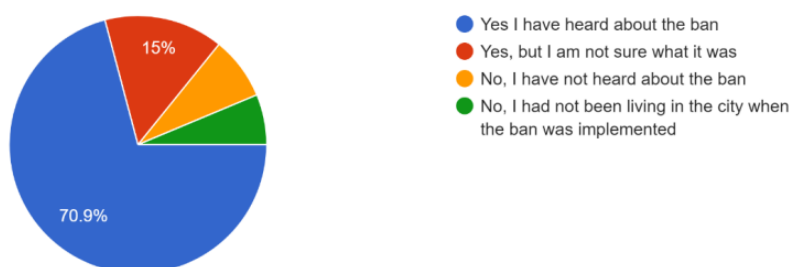


Figure 10. Shows whether the citizens have heard about the 2019 ban.

How did you find out about this ban?

127 responses

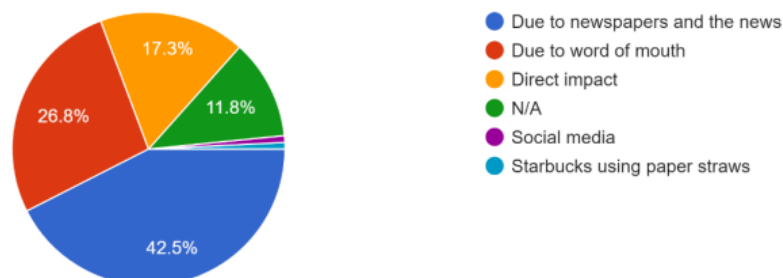


Figure 11. Shows how the citizens found out about the 2016 Ban.

Did you notice any change because of this ban

127 responses

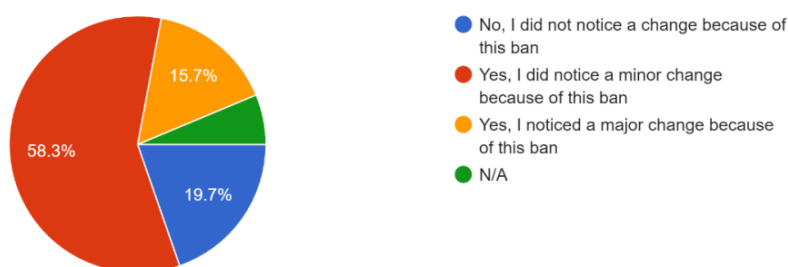


Figure 12. Shows whether the citizens noticed a change in consumption because of this ban.

Have you or anyone you know recently purchased anything that was bought using a plastic bag?
127 responses



Figure 13. Shows whether the citizens have purchased anything recently after the ban was announced.

Have you recently refused to use plastic when given a choice?
125 responses

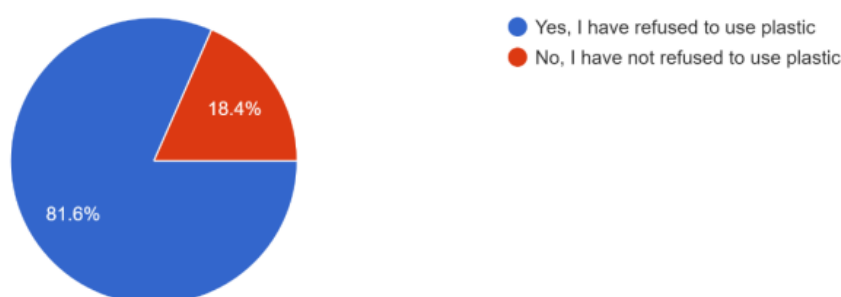


Figure 14. Shows whether the citizens have refused to use plastic when given a choice.

2. Karnataka Plastic Ban Statement

(18) Enforcement of Plastic Ban: (1) The penalty leviable for violation of the State's Plastic Ban Notification No. FEE 17 EPC 2012 dated 11-03-2016 shall be as per the circular No. Comm/PR/774/2016-17 dated 04-05-2016.

(2) For repeat violators, the fine amount shall be levied upto five times the amount mentioned in the circular No. Comm/PR/774/2016-17 dated 04-05-2016.

(3) Strict action will also be taken to close and seal the premises /suspend or even cancel the Trade Licence of those violating shops and establishments who continue using banned plastic even after repeated warnings and levy of penalties, for a minimum period of one year at least.

(4) The fines and penalties shall also be applicable on customers and general public who use single use plastics as banned in the Forest, Environment & Ecology Dept. Notification dated 11-03-2016 and Circular dated 04-05-2016.

(5) BBMP shall have a right to conduct joint raids with KSPCB/revenue and other jurisdictional enforcement authorities and seal the premises of manufacturing units of banned single use plastic and levy penalties.

(6) All the seized banned plastics shall be shredded and stored at any of the designated facilities of BBMP before they are utilized for permissible uses such as laying of roads, co-processing, RDF feedstock, etc.

Figure 15. Shows the official declaration of the Ban.

3. Fines

Enforcement of Plastic Ban			
13.	Trading, retailing, selling of banned plastic items [#]	50,000	1,00,000
14.	User of banned plastic items [#]		
	Commercial Users	25,000	50,000
	Domestic Users	500	1,000
[#] As per Plastic Ban Notification No. FEE 17 EPC 2012 dated 11-03-2016 and subsequent amendments thereof.			

Figure 16. Shows the fines for using plastic commodities as stated by the bill.

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