



## Relevance of 'Single Use Plastic' in India: An Analytical Study

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### Abstract

The Ministry of Environment, Forest and Climate Change, Government of India notified the Plastic Waste Management Amendment Rules, 2021, on 12 August 2021. To proceed with the spirit of 'Azadi ka Amrit Mahotsava', a defining step to curb pollution caused by cluttered and uncontrolled plastic waste is being taken by the country. India banned manufacturing, importing, stocking, distribution, sales and usage of identified throw away plastic items, which have minimal utility and maximum/significant littering potential, all across the country from July 1, 2022. India is a party to the United Nations Environment Assembly (UNEA). In total 124 Nations are party to UNEA and India had signed a resolution to draw up an agreement which will in the future make it legally binding for the signatories to address the full life of plastics from production to disposal, to end plastic pollution.

Plastics have transformed our day to day life, and their use is expected to continue to rise. There are now 8.3 billion tonnes of plastic with in globe, yet only 6.3 billion of those tonnes are usable. It is our goal in this closing piece to summarise our existing knowledge of the positive effects and negative consequences of plastic usage, as well as what we want to accomplish moving forward. Clearly, plastics provide several social advantages as well as potential technical and medical advancements in the future. It's also important to note that issues concerning consumption and disposal are wide-ranging, including the build up of garbage in landfills and natural ecosystems, as well as health difficulties for animals caused by ingesting or tangling in polyethylene terephthalate (PET). Plastics are made using around 4% of the world's oil output as a feedstock and with about as much energy as that. In the contemporary era of mass manufacturing, packaging represents approximately a third of all materials consumed. This linear use of hydrocarbons via packaging and other short-lived plastic uses is simply not sustainable, given our diminishing fossil fuel supplies and constrained capacity for waste disposal in landfills. Green chemistry life-cycle studies and new risk assessment methods may help address the issue of littering, along with reducing the amount of waste that is thrown away at the end of a product's lifespan. The public, industry, scientists, and legislators working together will be the most effective way to implement these policies. However, the need is to comply with the new guidelines of the Government in order to protect environment and human health. In this paper We have discussed the recent guidelines issued by the Indian Government in August 12, 2022. It has further banned the disposable plastic in order to protect the environment. The detailed analysis of the SUP has been mentioned with the pros and cons of Plastic use with distinct reference to the stakeholders.

Keywords: - Plastic, Fossil, Single Use Plastic, Landfills

## I. INTRODUCTION

Plastic seems affordable, lightweight, robust, durable and corrosion resistant. Besides medicinal and technical advancements, energy savings, and several other social advantages, polymers have a wide range of applications. From roughly 0.5 million tonnes in 1950 to 260 million tonnes now, plastics manufacturing has grown significantly during the last 60 years.

More than 1.6 million people work in the plastics business in Europe alone, which has a turnover of more than 300 million euros. Polyethylene terephthalate (PET) and polyethylene nitrate (PAN) are used in almost every area of everyday life, from transportation to clothes and footwear to food packaging. For example, new medical uses, the creation of renewable energy, and a reduction in the amount of energy consumed in transportation might all benefit from new application of plastics in the future.

Despite the fact that traditional plastic manufacturing relies on fossil fuels, the plastics sector has grown to meet the world's increasing need for raw materials. In light of the wide range of uses for plastics, the output of plastics is predicted to quadruple in the upcoming twenty years. In 2018, around 360 million tonnes of plastics were manufactured, with 18.5 percent of that total being generated in Europe, according to figures from the worldwide plastics manufacturing industry.

### 1.1 Recent Development in India

"The Ministry of Environment, Forest and Climate Change, Government of India notified the Plastic Waste Management Amendment Rules, 2021, on 12 August 2021. Carrying forward the spirit of 'Azadi ka Amrit Mahotsava', a defining step to curb pollution caused by littered and unmanaged plastic waste is being taken by the country. India banned manufacture, import, stocking, distribution, sale and use of identified single use plastic items, which have low utility and high littering potential, all across the country from July 1, 2022. India is a party to the United Nations Environment Assembly (UNEA). In total 124 Nations are party to UNEA and India had signed a resolution to draw up an agreement which will in the future make it legally binding for the signatories to address the full life of plastics from production to disposal, to end plastic pollution. Let us discuss the meaning of Single use Plastic (SUP)."

### 1.2 Single Use Plastic

"Single-use plastic products (SUPs) are **used once, or for a short period of time, before being thrown away**. The impacts of this plastic waste on the environment and our health are global and can be drastic. Single-use plastic products are more likely to end up in our seas than reusable options."

### 1.3 List of Banned SUP items In India

"The Government of India has implemented firm measures to reduce pollution from littered Single Use Plastics. The banned items list includes: ear buds with plastic sticks, plastic balloon sticks, plastic flags, candy sticks, ice-cream sticks, polystyrene (Thermocol) for decorative purpose, plastic plates, cups, glasses, cutlery such as forks, spoons, knives, straws, trays, wrapping or packing films around sweet boxes, invitation cards, cigarette packets, plastic or PVC banners under 100 microns, and stirrers." It is pertinent to mention here that no doubt the SUP is creating lot of damage in ling run, however, Plastic has various advantages in the reduction of transportation cost or in the public health sector. However, there are various benefits of plastic as well let us explain as under:

## II. ADVANTAGES OF PLASTIC SECTOR

In industrialized parts of the globe, the consumption trends of the five most extensively used plastics in their many application sectors tend to be constant. Almost three-quarters of plastic waste is used in packaging applications (such containers and plastic bags), while another third or more is used in construction items like plastic pipes or polyvinyl cladding. In poorer nations, resin consumption patterns may be somewhat different; for example, in India, 42% of resin use was estimated to have been in the packaging sector.

More than only automobiles and toys and furniture are constructed from plastics. Plastics are tremendously being used in underdeveloped countries as an alternative to conventional materials such as paper, metal, wood, and glass because of their reduced unit cost and improved performance characteristics.

It is necessary to understand if there are any advantages of plastic or not. Plastic has definitely made our life easy and economical over the couple of years.

### 2.1 Plastic Innovations

To be sure, plastics play an important role in the variety of materials we now have at our disposal. Plastics and rubber are used in almost every facet of everyday life. Clothing, footwear, along with items for preparing food and public health, fall under this category. Worldwide, almost 40 million metric tonnes of polymers were turned into textile fibers (mainly in the form of nylon, polyester, and acrylics). Polyesters, fluoropolymers, and nylons make up the bulk of high-performance clothing, whereas polycotton clothing includes significant quantities of PET plastic. Fleece apparel may be created from recycled PET and is 100% plastic (PET). Polyurethane or even other elastomeric materials are used to make the footbed and outsoles of most footwear, while vinyl or even other synthetic polymers are utilised for the uppers.

### 2.2 Public Health Sector and Plastic

Plastics are also beneficial to the public's health in a variety of ways. They make it possible for medical devices such as surgical instruments, drips, aseptic medical packaging, and pill blister packs to be produced, as well as clean drinking water supplies. They utilise modified environment packaging, for example, to extend shelf life of fresh foods, to prevent food waste.

## 2.3 Transportation Cost

Plastics minimize transportation costs and, as a result, emissions of atmospheric carbon dioxide. Many modern governmental and non-governmental transportation vehicles, as well as some current airplanes, use up to 50% plastics in their construction. Common examples include the packaging trays seen on many cars, as well as the door liners, steer wheels, and other electrical components. Lightweight fasteners, doors and window, fittings and insulation materials are just few examples of how plastics may enhance and lower the cost of construction components. The usage of nylons, polyether ether ketones, polypropylene, and polymeric rubber compounds in World Cup-standard footballs and other sporting goods has also been shown to reduce energy consumption and improve the quality of numerous leisure activities.

Plastics provide unmatched design flexibility over a broad temperature range. Compared to competing materials, plastics have a low lifetime cost while providing excellent strength-to-weight and stiffness and toughness. They are also bio-inert, highly thermal and electrically insulating, non-toxic, and very durable. Any carbon and hydrogen-containing feedstock may be used to make plastics. While fossil fuels are now the primary source of plastics, components of natural such as sugars and maize may also be used. As much as 4% of worldwide oil and gas output is utilised as raw resources for plastics manufacture, and a comparable percentage is used as energy. As a result, plastics are able to contain carbon, which may be kept by recycling them.

## III. THE USE OF PLASTICS IN DAILY PRODUCTS:

### 3.1 Automotive

When it comes to automobiles, plastic is employed in a wide range of places: from outside paint to interior seats to dashboard components and the seatbelts that safeguard passengers. Lithium polymer car barriers, which power certain hybrid and electric automobiles, include plastics.

It is possible to construct automobiles safer and much more fuel efficient by using plastics in novel ways. All of these solutions rely on plastics, which play a crucial role in reducing weight while increasing fuel economy and reducing carbon emissions, as well as providing safety advantages like airbag deployment and seatbelt deployment. More and more automotive components are created from recycled plastics as automakers strive to satisfy sustainability targets and use recovered resources.

### 3.2 Safety

Plastics have an important role in automotive safety:

- Seat belts, which are made of long-lasting polyester fibre, have saved many lives in automotive accidents.
- In a frontal collision, airbags, which are generally constructed of high-strength nylon fabric, may lower the chance of death.
- Polymer science discoveries have made it feasible to develop child safety seats that safeguard our children at every turn.

### 3.3 Fuel Efficiency

In order to improve fuel economy, reduce pollutants, and cut the cost of driving, automobile designers must focus on decreasing weight. It is possible that plastic components weigh half as much as their metal or wood counterparts. Currently, plastics account for half of a vehicle's volume, but only 10% of its weight.

### 3.4 Style & Innovation

In contemporary autos, plastics provide technical and aesthetic advantages. In addition to being lightweight, plastics allow designers to come up with concepts that would otherwise be unachievable or almost difficult to put into practise. Additionally, plastics are able to withstand dents, dings, stone chipping, rust, and other types of damage. Parts may be consolidated and assembled in a modular fashion, resulting in lower manufacturing costs.

### 3.5 Building and Construction

Every aspect of our existence is influenced by the buildings we inhabit. And chemistry-based materials may be found in everything from roofs to floor and wall coverings to insulation to worktops and surfaces. Almost every aspect of architectural construction and maintenance involves the usage of plastics, from reflective roof membranes to waterproof sealants and caulks. High-performance materials and solutions have been developed to address a wide range of issues, including climate change mitigation, enhancing occupant health and quality of life, boosting energy efficiency, and increasing a building's ability to withstand natural catastrophes.

### 3.6 Consumer Goods

Plastic is a common component in a wide variety of everyday consumer goods. Even though chemistry's products are priceless, they must be handled with care. The chemical industry is dedicated to the safe, responsible, and long-term management of chemicals throughout their entire lifecycles and for their intended purposes. Many of the items and technology we use on a daily basis include some kind of plastic. Plastic is used in a various items, such as:

- 3.6.1 **Personal Care Products:** Personal care products, such as lotions, soaps, shampoos, and even cosmetics and deodorants, depend on surfactants to make them easier to use and more effective.
- 3.6.2 **Cleaning Products:** Home cleaning solutions, detergent and other items may help remove soils, bacteria and other impurities while preventing the transmission of infectious illnesses as well as controlling allergies, which can be harmful to people's health.
- 3.6.3 **Sports Equipment:** Carbon fiber-reinforced plastic gear & safety equipment is often used by bicyclists, skiers, hikers, mountain climbers, and other outdoor enthusiasts, from skis, boots, helmets, and shin pads to goggles and other protective eyewear.
- 3.6.4 **Electronics and Appliances:** Chemistries such as silicones, polycarbonate plastics, phthalates, and more may be utilized to enhance durability, heat resistance, and performance of items such as TVs, computers, and mobile phones.
- 3.6.5 **Electronics:** Plastic's cutting-edge technical advances stimulate new computer, telecommunications, smart appliance, and other consumer electrical device breakthroughs. A wide variety of devices, from TVs and mobile phones to computers & kitchen appliances, fall under the umbrella of "consumer electronics." These goods are all distinctive in terms of their appearance, functionality and safety features. Elements such as fluoropolymers, flame retardants, silicones, polycarbonate plastic, and phthalates are just some of the various chemistry-based materials that are involved in the production of today's electronic gadgets.

As an example, plastic components play a crucial role in reducing the weight and size of a wide range of electronic devices, while also safeguarding critical technical components and reducing the amount of raw material used in manufacturing. Engineering a plastic product is also feasible to meet specific performance objectives, such as minimizing energy consumption over its lifespan.

One fact that cannot be denied is that plastics in spite of being dangerous and polluting in a multitude of ways still continues to be a material that is hard to replace and is present in different forms as an agent that makes our lives easier and makes resources more accessible. Whilst being one of the most notorious and talked-about topics in the realm of environmental problems, one cannot avoid looking at the ways in which plastics make our life better such as:

- In automobile engineering, there has been a rising trend of using plastic components. Since plastic is lighter compared to metal, it helps to reduce the overall vehicle weight, thereby enhancing fuel efficiency. This improvement in fuel efficiency positively impacts the environment.
- Another way it helps with the fuel economy is with plastic packaging which in addition of being light has also become satisfactorily sturdy which has consequently led to the recent shift in the arena of product packaging and transportation. It is estimated eliminating plastics would raise the weight by four times.
- Paper is a product which has been widely discussed as a replacement for plastics, this glorification usually interjected by economic factors but what must also be observed is that simply the production of paper needs a greater amount of energy and water than plastics while also having a shorter lifespan.
- Advancements in science have added on the benefits of plastics in terms of building materials like plastic windows and parts that filter Ultraviolet rays in order to keep the building cool in summers and vice versa. EPS Insulations are another example within the same field of application. This system requires less usage of money and resources and is another beneficial impact on the environment.
- The core of plastic's usability lies primarily in its wide range of applications and it's nature which can be molded as per the requirement, in the field of sports safety gear manufacturing items of plastic helmets, goggles and padding which have become lighter and stronger especially with the addition of shock absorbing foam and shells.
- While shifting our gaze to the aviation sector, plastics have yet again proven their usability as a manufacturing material with the Airbus A380 being manufactured from plastics reinforced with lightweight fiber.
- Even in the manufacturing of solar panels and wind turbines plastics have a key application. What also goes in it's favor is the simple fact that plastics are easier to recycle.
- Other than these, the sheer convenience, scale of economy, optimization of processes and the recent improvements when it comes to manufacturing plastics have had a combined effect the pleading the case for the positives regarding this often-vilified material which while raising legitimate concerns has also been a boon in so many ways. The pressing need consequently is not the elimination of plastics but responsible and more sustainable ways of dealing with plastic waste.

Medical applications such as tissue and organ transplantation, also lightweight components like those in the modern Boeing 787, would benefit from plastics' ability to minimize fuel consumption; components for the production of renewable energy & insulation will reduce carbon emissions; even smart plastic packaging is expected to be able to monitor and signal perishable items' condition.

Plastics have many potential uses in the future, but current manufacture, usage, and disposal methods are clearly unsustainable and endanger animal and human health. Several of the environmental risks are well-known, there remains many unanswered questions concerning how they affect human health. It's possible to find a solution, but it'll need a coordinated effort. Individuals have a role to play through adequate use and disposal, especially recycling; industry has a role to play through green chemistry, material reduction, and product design for reuse and/or end-of-life recyclability; and

governments and policymakers have a role to play through the establishment of standards and targets, the definition of relevant product labelling to inform and encourage change, as well as the funding of existing scholarly research and technological advancement.

The contemporary world would be unable to function without plastics, even in the face of rising public distrust. Modern computers, mobile phones, and most life-saving discoveries in medicine were made feasible by plastics. Plastics, which are both lightweight and effective at insulating, save energy in both heating and transporting. Most importantly, low-cost plastics increased the average person's quality of life and opened the door to more material plenty. We may only be able to afford luxury goods if plastics were unavailable to the general public. Many of our goods have been made lighter, safer, and stronger by substituting natural materials with plastic.

A growing body of research is being conducted to improve the safety and sustainability of plastics, given their widespread use. Bioplastics, which are created from plant crops rather than fossil fuels, are being developed by some inventors as an alternative to conventional plastics as they are more ecologically friendly. In the meanwhile, others are striving to develop polymers that are really biodegradable. Some inventors are working to improve recycling efficiency, and some even aim to develop a method that would convert plastics back into the energy sources from which they were originally created. Plastics are not flawless, yet they are essential to our future. Plastic has played a positive role on enhanced health and safety for consumers, material conservation and energy saving as well. Let us discuss the impact of plastic on the world in its entirety.

## **IV. THE IMPACT PLASTICS HAVE ON THE WORLD AS A WHOLE**

### **4.1 Enhanced health and safety for consumers**

The use of plastics in water and food packaging contributes to the well-being of customers. When it comes to ensuring that people have access to safe drinking water, plastics have become a vital component. Because of their low weight and ease of fabrication, plastics have been extensively utilized in a wide variety of water treatment & distribution channels "(e.g. sewerage, storm water, land drainage and irrigation)". By regulating temperature and environment within the box, plastic food packaging ensures safety, time-dependent storage of fresh fruit and other food items" "(using gas-flush packaging and oxygen scavenger technology)". In addition, low-cost indicator labels may be utilized to monitor the quality of packaged goods (particularly their time–temperature history).

Plastic has been utilized in the manufacture of medical gadgets, throwaway injections, medical implants, and anti-malarial mosquito nets, all of which have helped save lives. Due to its cheap cost and durability, plastic is often used in solar panels and wind turbines, but it has also assisted us combat food-borne diseases by offering better packaging. Plastic is essential to the functionality and affordability of most contemporary technical items, including computers, cellphones, TVs, tablets, and more. It's hard to conceive how we'd live without them in our modern civilization.

## **V. MATERIAL CONSERVATION**

Because plastics have a high strength to weight ratio, they may be used in package design with little material consumption (and hence cheap cost) because of their light weight. The typical weight of plastic packaging is between 1% and 3% of the overall weight of the product. To package 200 grammes of cheese, 2 grammes of plastic film is needed; 1.5 litres of liquid may be held in a 38-gram container, and 125 grammes of yoghurt weighs only 4 grammes. Plastic packaging has a better ecological balance sheet than most other packaging materials when considering the overall amount of energy used in manufacture, transportation, and disposal, as well as other environmental implications. If you were to transition to plastic pouches from paper-based milk cartons, you might expect to save 72% of the energy needed to produce the package, a 50% reduction in refrigerated space, and a 90% reduction in trash to landfill, according to research published in the journal *Environmental Science and Technology* (ES&T).

As oil prices rise, the production of renewable energy supplies is expected to increase. Wind, solar, and geothermal energy are all infinitely renewable. Some European regions now use renewable energy to fulfil the majority of their thermal, hot water, and power needs, while Iceland uses geothermal energy. To help this endeavor, plastics may be utilized as a material for new and creative designs. For example, new solar water heaters incorporating polymers like PE and PVC may provide up to 66% of a household's yearly hot water use. The remainder of a house's energy needs may be met by photovoltaic collectors, which turn sunlight into electricity. In order to exploit these technologies, polymers would have to be lightweight, moldable, UV resistant, and insulating.

It's important to note that plastics are able to catch about 1/2 of carbon that is needed to make them. Plastics may be recycled in a variety of ways due to their unique qualities. As long as proper waste management methods are in place, plastic trash may be reused, recycled, converted into fuels or chemicals, or burned to generate energy, all of which can be used to plastic garbage. The majority of primary recycling and post-consumer recycling of elevated plastics makes environmental and economic sense, and the greatest advantages are gained when recycling is considered as a materials conservation strategy rather than a waste management plan. The recycling of waste streams including a variety of plastics may be a challenge. Utilization of the high temperature value of post-consumer plastics is made possible via waste to energy by means of incineration in this instance. Plastics have a larger energy content than paper, making the latter technique more beneficial compared to other types of packaging.

## VI. ENERGY SAVINGS

There is a climate change conundrum with plastics. Increased utilization of plastics, contrary to common assumption, lowers society's reliance on nonrenewable fossil fuels and hence lowers its emissions of greenhouse gases. Plastic's advantageous qualities, such as its low weight, increased manufacturing efficiency, and superior insulating capabilities, account for this.

By using plastics, we are able to get more done while using fewer resources. It's a thin, light material that allows us to reduce the weight of our goods and packaging. Other materials like cardboard, metal, and glass need more energy to make and turn into finished items.

There are several ways in which plastics conserve energy, including:

**6.1 Insulation savings** - To keep their interiors warm in the winter and cool in the summer, many houses and businesses use plastic insulation. As a result of using EPS insulation, for example, less heating fuel or air conditioning energy is needed, which helps save vital natural resources.

**6.2 Energy-efficient refrigerators and freezers** – Foamed polyurethane layered between molded plastics panels is used in almost all refrigerators nowadays to assist keep the inside of the refrigerators cool. Fridges don't have to struggle as hard to maintain a cold temperature, which saves us money on our power costs while still preserving the quality of our food. Insulation is the most important factor in getting the Energy Star reviews that appear on refrigerators.

**6.3 Agricultural production savings** - Conserving energy while preserving the crop is a major benefit of using plastics in greenhouses, ground film, and other soil improvement methods to boost yields. A 60 percent increase in yields has been obtained, as well as the ability to produce crops outside of the growing season to suit customer demand.

In contrast to common assumption, increasing the use of plastics would actually cut the total usage of non-renewable sources fossil fuels & decrease society's greenhouse gas emissions, contrary to what many people think.

## VII. THE FUTURE OF PLASTIC

According to futurist Hammond's new book, "The World in 2030," the rate of technological growth is increasing exponentially, and as a result, by 2030, it will seem as though the first thirty years of the 21st century had seen a century's worth of progress. The world of 2030 will be a much different place from the one we know now. Plastics will have a far larger part in our daily lives throughout this time period. A wide range of vital tasks for plastics, including body cells or perhaps even organ transplants, crucial materials for ultra-lightweight automobiles and aeroplanes, better insulation for houses powered by solar technology, reusable electronic media for books and magazines, smart packaging monitoring food content for symptoms of rotting, and high-efficiency. New polymers derived from renewable biomass are projected to become more common as fossil fuel sources deplete. Plastics currently have a wide range of mechanical & aesthetic performance attributes that these new additions will help to enhance. Thus, any future in which we don't use plastics in some capacity appears implausible." However, there is no doubt, an adverse impact on environment. There are recent development on the Single Use Plastic ban in India is happening, let us discuss the detailed analyses as under:

## VIII. RECENT DEVELOPMENTS IN INDIA ON THE USE OF 'SINGLE USE PLASTIC'

"India is not the first country to ban single use plastic. Bangladesh became the first country to ban thin plastic bags in 2002 and later on New Zealand became the latest country to ban plastic bags in July 2019. China too had issued a ban on plastic bags in 2020 with phased implementation. As of July 2019, 68 countries have plastic bag bans with varying degrees of enforcement".

### 8.1 Impact of SUP on Environment

"The adverse impacts of littered single use plastic items plastic on both terrestrial and aquatic ecosystems, including in marine environment are globally recognized. Moreover, addressing pollution due to single use plastic items has become an important environmental challenge confronting all countries. In the 4th United Nations Environment Assembly held in 2019, India had piloted a resolution on addressing single-use plastic products pollution, recognizing the urgent need for the global community to focus on this very important issue. The adoption of this resolution at United Nations Environment Assembly (UNEA) 4 was a significant step. In the recently concluded 5th session of United Nations Environment Assembly in March 2022, India engaged constructively with all member states to develop consensus on the resolution for driving global action on plastic pollution".

## 8.2 The Plastic Waste Management Amendment Rules, 2021

“The Plastic Waste Management Amendment Rules, 2021, also prohibits manufacture, import, stocking, distribution, sale and use of plastic carry bags having thickness less than seventy- five microns with effect from 30th September, 2021, and having thickness less than thickness of one hundred and twenty microns with effect from the 31st December, 2022”.

It means the ban does not cover all plastic bags; however, it requires the manufacturers to produce plastic bags thicker than 75 microns which was earlier 50 microns. As per the notification, the standard shall be increased to 120 microns in December this year. The notification clearly mentioned that plastic or PVC banners/ hoardings should contain more than 100 microns in thickness, and non-woven plastic (polypropylene) to be more than 60 GSM (grams per square metre). Non-woven plastic bags have a cloth-like texture but are counted among plastics. Still the plastic or PET bottles, counted among the most recyclable types of plastic, have been left out of the scope of the ban.

“Increasingly, the plastics industry is emphasizing sustainability, renewable energy, independence from foreign oil, and biodegradability. Synthetic or semi-synthetic polymers known as plastics have a wide range of properties, including lightweight, strength, durability, and cheap cost. As a result of these salient features, they've grown ubiquitous in human culture during the previous half-century. “The term "plastics" encompasses a wide range of synthetic polymeric materials derived from fossil hydrocarbons, such as polyethylene terephthalate (PET or PETE), high-density polyethylene (HDPE), polyvinyl chloride (PVC), low-density polyethylene (LDPE), polypropylene (PP), and polystyrene (PS), and are tailored to meet the diverse needs of thousands of end products.”

According to Bourguignon, “plastic materials may be divided into three major groups depending on their physical features: thermoplastics, thermosets, and thermosets”. These three types of materials are referred to as thermosets (plastics that cannot be returned to liquid state and reshaped), thermoplastics (plastics that can be returned to liquid state and reshaped, or recycled), & elastomer (soft elastic plastics).

## 8.3 Initiatives of Government of India

“The Government of India has also taken steps to promote innovation and provide an ecosystem for accelerated penetration and availability of alternatives all across the country. In order to make the effective enforcement of ban, national and state level control rooms shall be set up and special enforcement teams will be formed for checking illegal manufacture, import, stocking, distribution, sale and use of banned single use plastic items. States and Union Territories have been asked to set up border check points to stop inter-state movement of any banned single use plastic items”.

CPCB Grievance Redressal App has been launched to empower citizens to help curb plastic menace. For wider public outreach, PRAKRITI - mascot was also launched on 5<sup>th</sup> April.

The Government has been taking measures for awareness generation towards elimination of single use plastics The awareness campaign has brought together entrepreneurs and startups, industry, Central, State and Local Governments, regulatory bodies, experts, citizens organizations, R& D and academic institutions.

## 8.4 Extended Producer Responsibility (EPR)

“The Ministry of Environment, Forest and Climate Change had also notified the Guidelines on Extended Producers Responsibility on plastic packaging as Plastic Waste Management Amendment Rules, 2022 on 16<sup>th</sup> February, 2022. Extended Producer Responsibility (EPR) is responsibility of a producer for the environmentally sound management of the product until the end of its life. The Guidelines provides framework to strengthen circular economy of plastic packaging waste, promote development of new alternatives to plastic packaging and provide next steps for moving towards sustainable plastic packaging by businesses”.

## 8.5 Impact of Ban

“The success of the ban will only be possible through effective engagement and concerted actions by all stakeholders and enthusiastic public participation”. However, if we take examples from our past, in India almost 25 Indian states had banned plastic previously at state level. However, these bans had a very limited impact in reality because of the widespread use of these items.

Now the challenge is to see how the local level authorities shall enforce the ban as per the spirit of the guidelines. If we see the banned items like ear buds with plastic sticks, plastic sticks for balloons etc. are non- branded items and it is difficult to find out who is manufacturer and who is accountable for selling because all these items shall be available in the local market even after the issuing of guidelines.

## IX. CONCLUSION

The consumer needs to be informed about the ban through “advertisements, newspaper or TV commercials or something on social media on this ban that will help inform people about this ban taking place in the country”. The Companies need to spend money in research and development and find sustainable alternatives. In reality, fighting with the problem of plastic is not a government’s responsibility, however, it is the responsibility of industries, brands, manufacturers and most importantly the consumers. Finding alternatives to plastic seems little difficult, however, greener alternatives of plastic may be considered a sustainable option. For example, compostable and bio-degradable plastic etc. may be considered as an option.

No doubt it is a good initiative, but till the time, alternative is not available for the plastic and it is not informed to the vendors of single use plastic, it shall not be practically feasible to implement the complete ban.

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