

Smart Plastic Waste Recycler

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ABSTRACT

Reusing plastic is one of the numerous powerful methods for lessening the carbon impression of the planet. Yet, the vast majority of the plastic waste in Mumbai winds up in the dumping yards and consumed alongside the other junk, rather than getting reused. 3.5 huge amounts of plastic are in this manner transmitted in the city's air as dangerous gases. Plastic waste is an overall issue-cause air pollution, water defilement and so forth. The real reason for this is the powerlessness of the nearby government body to isolate plastic waste from other junk. The hurtful impacts of wasteful plastic transfer, its causes and the danger it stances to Mumbai are altogether checked on in this paper. The Store Discount framework utilizing savvy refuse jars can beat this issue by isolating plastic from other waste for reusing. To actualize the framework, standardized identification examining innovation is utilized to store a charge while purchasing a plastic item and a standardized identification scanner at the savvy can checks the standardized identification for discounting the expense to the client. Alongside a contextual investigation of the attainability of a comparative framework that was executed by the Zero Waste Scotland commission, we likewise close the favourable circumstances and disadvantages of the framework..

1. INTRODUCTION

Mumbai faces an enormous issue of real decline exchange adding to the creating air, water and soil pollution over the span of ongoing years. Of the 1,27,486 tons of waste made step by step in India in 2011-12, Mumbai alone spoken to 6.11 for every penny. It is assessed that every occupant in the city presently makes around 630 grams of waste each day, and accept that is required to contact 1 kg in the coming years. The BMC's yet-to-be-released Condition Status Report for 2015-16 shows plastic, glass, metal and paper speak to 17% of the total waste made every day while 73% is grains and vegetables. Plastic waste is particularly an uncommon purpose behind stress for the network body as there is no way to get of setting up the equivalent. Starting late the city body took a decision to offer a markdown in property obligation to hotel social requests which execute 'zero junk' plan in their premises. With two (Deonar and Mulund) of three dumping grounds in Mumbai having accomplished their full limit and the metro body standing up to firm assurance from nonconformists and NGOs over the Kanjurmarg landfill, the BMC rushes to decrease the total quantum of waste the city produces. The genuine piece of the waste made contains a liberal proportion of plastic things. A larger piece of this plastic is normally masterminded off in the channels, lakes, streams in the sea or is burned in the dumping grounds. Plastic is one thing which ought to be reused instead of being organized like non-plastic materials. In light of the deficient waste organization course of action of the speaking to body of the city, the necessity for working up the Store Discount framework using brilliant rubbish jars was seen. Any individual who happens to purchase any plastic thing or a thing which is enclosed by disposable plastic will pay some additional store on the thing. The plastic things that are purchased will have a stand-out standardized identification engraved on them. Exactly when the individual sees the things he obtained fit for transfer, he/she just needs to find the nearest keen junk can and stick the plastic with the scanner tag into the machine space. The savvy can will check the institutionalized standardized tag and discount the customer's similar money. People would regularly get their discount and in this manner won't falter to organize off all possible plastic waste in their family unit. In any case, a couple of individuals may neglect the discount charge and may arrange the plastic materials nearby the other refuse or basically dispose of it in broad daylight places. That being stated, some other individual willing to pick up two or three rupees may arrange the plastic in the nearest brilliant can. Thusly, plastic materials will

be isolated from rest of the city squander and will along these lines allow the city's controlling body to suitably reuse plastic rather than devouring it and turning away landing of toxic gasses into Mumbai's air.

2. REVIEW OF LITERATURE

2.1 The Plastic Problem

The dishonourably disposed of plastics from automobiles, neighbourhood individuals or houses, or left into an adequately full waste canister, or incidentally trucked away by a hurricane, begin to messy the earth scenes littered by plastic packaging, have ended up being fundamental in numerous parts of the world, unlawful dumping of plastic and flooding of control structures in like manner expect a section. Plastic has superseded the before material used as a piece of packaging, bundling industry for example glass, paper iron, and aluminium, these animals are less dangerous than plastic. The plastic has a low recovery rate, inefficient to reuse as reused piece in the collecting strategy, in view of enormous getting ready difficulties a low liquefying point which keeps contaminants from being driven off amid warming and reprocessing

2.2 Effect on the environment

Plastic waste is an overall issue, yet with nearby variability. One wellspring of air pollution is expending of plastic waste in the open field and heating up of the incorporating air. This is moreover legitimate for plastic waste in the marine condition with respect to water tainting and opportunity of synthetic substances contained. The property of plastic makes it so gainful and moreover its exchange winds up doubtlessly unsafe, for instance, its quality, lightweight, and simplicity. As a general rule, plastic is disposed of after use; hereafter being solid they persevere in nature. Plastic has ended up being all inclusive and India is no extraordinary case. Most of the conditions, the Civil Strong Waste containing around 10-12% of plastic is signed, releasing deadly gasses into nature which fuse substances like Dioxins, Furans, Mercury and Polychlorinated Biphenyls. Only a few focuses on the impact of such hurtful gasses have been performed in India. Landfills have added to about 20% of Green House Gasses trailed by oil based commodities. Starting at now, landfills are over-trouble with waste dumps and misuses being seared nearby plastic sacks are posing prosperity perils. A snappy measure to address them is the need. Plastic waste can pull in contaminants, for instance, eager regular defilements. This is so in the marine condition since countless contaminants are hydrophobic, plastic could go about as a sink for contaminants, making them less open to untamed life, particularly in case they are secured on the sea base.

2.3 Mumbai's plastic threat

Mumbai produces 7500 metric enormous measures of waste every day, of which nearly 9% of plastic waste. The data, procured from a present report demonstrates the city has not yet taken in, its exercises regardless of the genuine common impact of plastic, saw especially in the midst of the 2005 tempest where it chocked channels, streams and finally the city. This is one issue where we should share the blame of the BMC. From littering the sea agree with pet containers to wrapping the sprouts used as a piece of petitions and after that basically hurling them into the Mithi, subjects have added to the issue, Government associations need to make more care about the risks of capricious exchange of plastic and nationals need to respond all the more carefully to contain the issue. The BMC's yet -to-be-released Condition Status Report for 2014-16 exhibits plastic records for around 675 MT of the city's indicate each day waste created in that year. Honestly, the quantum of plastic waste created by the city has extended consistently. For instance, in 2010-11, 10 % (650 MT) of the total, 6500 MT of waste made was plastic which dove the following year to 9 % or 630 MT of the 7000 MT of garbage created. While in 2014-15 too much plastic records for 9 %, it has extended in absolute terms as the total waste made is altogether higher.

4. PLASTIC RECYCLING

Plastic Recycling recovers the scrap or the waste plastic and reprocess the material into useful products, The plastic is non-biodegradable, It includes melting down soft drink bottles and casting them as the plastic chairs and the tables, Plastics are recycled during the manufacturing process of plastic goods such as polyethylene film and the bags.

4.1 Plastic recycling advantages

Plastic Recycling helps to reduce the energy usage, It reduces the consumption of fresh raw materials, It reduces the water pollution and the air pollution (from the land filling) by reducing the need for conventional waste disposal and it reduces the greenhouse gases emissions. Recycling conserves the natural resources & the energy that would be required to produce plastic from scratch, Recycling old and waste products into new products reduces the amount of waste that go to the landfills and recycling one ton of plastic can save 7.4 cubic yards of landfill space.

Plastics becomes easy to recycle, Besides the invention of new plastic recycling technology, Plastic Recycling protects the environment, It spreads awareness for the environment, It promotes judicial and sustainable use of resources and it creates green jobs. Plastic Recycling saves the Earth, It can help minimize the cutting of trees that are used to make the paper, conserving the forests will help the environment, This is because the trees are known to improve the air, prevent the floods and provide the raw materials and the nourishment. Plastic Recycling conserves the energy, Processing the raw materials that come from the trees and the other natural resources takes more energy than recycling materials, we are minimizing the use of energy that can decrease the pollution, minimize the health risk and help the economy.

Plastic Recycling helps in mitigating the global warming and in reducing the pollution, The fossil fuels use that emit such harmful gases will be minimized, And by recycling non-biodegradable waste, The air pollution and greenhouse gas emissions will be reduced. Plastic Recycling minimizes the waste products placed in the landfills that harm to the environment, a lot of the waste materials thrown in the landfills all over the world are composed of non-biodegradable products that take a long time to decompose.

Plastic Recycling can help you save the money; there are companies that pay cash for your trash, patronizing the recycled products saves your money because they are less expensive. Plastic Recycling can reduce the need for the allied activities such as the transportation and mining which are the biggest producers of the greenhouse gases and the pollution.

4.2 Plastic recycling disadvantages

Plastic recycling can be harmful to the environment, when the material is melted down, VOCs are released into the atmosphere, and they are harmful to nearby plant and animal life. VOCs (volatile organic compounds) released from plastic recycling harm the environment; they present health risks to the people who use the recycled plastic, plastic resin is manufactured from the petroleum and it can leech into the foods that are stored in the recycled plastic containers.

The heat is required to melt the plastic, the process generates carbon emissions, the harmful greenhouse gases contribute to the global warming and they are already taking an effect on our planet's climate, as the plastic carries the potential health threats, much of recycled plastic will be less useful product.

After the plastic has been recycled once, it is very rarely suitable for the second round of recycling, So, the material will end up in the waste, If the plastic recycling continues in this way then the manufacturers will always have the same demand for new material. Plastic Recycling tons of garbage will require separate factories, This could result in more pollution and energy consumption to clean, sort, store and transport the waste materials, The need for extra bins for different kinds of trash will be needed, This can equate to more trucks to pick them up, increasing the air pollution.

Plastic Recycling will produce the pollutants, including the chemical stews after breaking down the waste materials, It can hurt the environment, if not planned well, Recycling is not always cost-efficient and it can result in net loss year after year. Plastic Recycling can increase low quality jobs, these include sorting the garbage, cleaning toxins and doing the other manual and the intensive labour, this can result in low morale, low income and poor quality of life in the community.

Plastic Recycling can create more environmental problems, if not done right; recycling companies might abandon dump sites and leave the harmful chemicals to contaminate the land and the environment. Plastic Recycling does not guarantee good quality products, Plastic Recycling can give the people the false sense of security, and they believe that unless the humans really know the extent of the damage of the waste, plastic recycling will remain of little value to a lot of people.

4.3 Different types of plastic

4.3.1 Polyethylene Terephthalate (PETE or PET)

Introduced by J. Rex Whinfield and James T. Dickson in 1940, this plastic is one of the most commonly used on the planet. Interestingly enough, it took another 30 years before it was used for crystal-clear beverage bottles, such as the ones produced by Coca-Cola and Pepsi. PETE plastics make up 96% of all plastic bottles and containers in the United States, yet only 25% of these products are recycled. By being mindful and making sure to recycle code 1 plastics, you're helping to ensure a cleaner environment and less landfill pollution!

4.3.2 High-Density Polyethylene (HDPE)

In 1953, Karl Ziegler and Erhard Holzkamp used catalysts and low pressure to create high-density polyethylene. It was first used for pipes in storm sewers, drains, and culverts. Today, this plastic is used for a wide variety of products.

HDPE is the most commonly recycled plastic because it will not break under exposure to extreme heat or cold. According to the EPA, 12% of all HDPE products created are recycled in a year. This is a very small dent in the planet's carbon footprint.

4.3.3 Polyvinyl Chloride (PVC)

PVC is one of the oldest synthetic materials in industrial production. It was actually discovered on accident twice; once in 1838 by French physicist Henri Victor Regnault and again in 1872 by German chemist Eugen Baumann. On both occasions, these men found it inside vinyl chloride flasks left exposed to sunlight.

PVC is one of the least recycled materials; generally less than 1% of PVC plastic is recycled each year. It has been called the "poison plastic" because it contains numerous toxins and is harmful to our health and the environment.

4.3.4 Low-Density Polyethylene (LDPE)

LDPE was the first polyethylene to be produced, making it the godfather of the material. It has less mass than HDPE, which is why it's considered a separate material for recycling.

Packaging and containers made from LDPE make up about 56% of all plastic waste, 75% of which comes from residential households. Fortunately, many recycling programs are evolving to handle these products. This means less LDPE will end up in landfills and negatively affect the environment!

4.3.5 Polypropylene (PP)

J. Paul Hogan and Robert L. Banks of Phillips Petroleum Company discovered polypropylene in 1951. At the time, they were simply trying to convert propylene into gasoline, but instead discovered a new catalytic process for making plastic.

Only about 3% of polypropylene products are recycled in the US, but interestingly enough, 325 million pounds of non-bottle plastics were collected for recycling over a year. In other words, a lot of this plastic is created, but only a small fraction is actually recycled.

4.3.6 Polystyrene or Styrofoam (PS)

In 1839, German apothecary Eduard Simon accidentally came across polystyrene while preparing medication. He isolated a substance from natural resin and didn't realize what he had discovered. It took German chemist Hermann Staudinger to research this polymer and expand on its uses.

Since polystyrene is lightweight and easy to form into plastic materials, it also breaks effortlessly, making it more harmful to the environment. Beaches all over the world are littered with pieces of polystyrene, endangering the health of marine animals. Polystyrene accounts for about 35% of US landfill materials.

4.3.7 Miscellaneous Plastics

The remaining plastics include: polycarbonate, polylactide, acrylic, acrylonitrile butadiene, styrene, fiberglass, and nylon. Of course, there are many differences in the plastics classified as miscellaneous by recycling programs.

Many BPA products fall into this category, which means it's best to avoid this plastic for food products. It is not very easy to break down these plastics once they are created, unless they are exposed to high temperatures. This makes these plastics nearly impossible to recycle.

5. DISCUSSION/RESULTS

5.1 Case Study – Scotland's Deposit-Return System

Scottish Government requested that Zero Waste Scotland commission a bit of work to investigate the attainability of enhancing reusing and decreasing littering of savors holders Scotland by means of a Deposit Return System (PWR). PWR systems are a component of reusing foundation in various European nations, and around the globe. In a PWR system, the shopper pays a little store when they buy an item in a focused on holder – this cash is discounted when the compartment is come back to be reused at a system gathering point. The attainability examine was embraced by Eunomia. The plausibility contemplate recognized - in view of training abroad, past applicable investigations, and partner discussions how a PWR system could work in Scotland, how it may play out, the outline decisions that would be significant, and a portion of the expenses and advantages that would be normal from a Scottish PWR. We initially depict the system delineated by Eunomia, and after that consider a portion of the components of the Eunomia think about that would profit by promote thought, or where confirm on a PWR choice could be additionally created.

As far as general outline standards, Eunomia feature that while the system can be reached out to different things – and propose the plausibility of doing as such is investigated likewise feature that beverages holders (with a short buy devour arrange traverse) are extremely reasonable for stores, as the store isn't bolted away for a long stretch. Eunomia conceive a plan tolerating the broadest scope of materials conceivable (PET, HDPE, jars, glass, containers). Any plan should cover all potential bundling choices for an item class to maintain a strategic distance from making an impetus to switch between bundling alternatives. The store proposed would be between 10p and 20p for a standard holder (with arrangement for this to be changed after some time in accordance with swelling), and they anticipate, in view of abroad understanding, this would give an arrival rate of more than 85%. On the ground the system would be a blend of robotized and manual reclaim, basically at purpose of retail. No issues are visualized in fusing remote country ranges or the islands. The material would be claimed by the PWR system. Eunomia depict a model where a solitary focal body deals with the system on an on a non-benefit premise, and feature various contemplations around system.

Eunomia recommend the accompanying direct expenses and advantages of running a system:

5.1.1 System Costs

- One-off set up costs = £15m
- Machine reclaim (p.a.) = £29m
- Manual reclaim (p.a.) = £8m
- Logistics (p.a.) = £20m
- Counting focuses (p.a.) = £3m
- Admin (p.a.) = £3m

5.1.2 System Income

- Income from unredeemed stores (p.a.) = £24m - £36m
- Income from material (p.a.) = £20m - £22m
- Producer charges (covering system shortage) (p.a.) = £6m - £17m

5.1.3 Nearby Authorities

Modeling recommends a net sparing (from gathering and transfer costs) (p.a.) = £5m; £1m (HWRC); £7m (litter) [7] While Scotland's PWR is applicable to only plastic beverage containers, the Deposit-Refund system would be applicable for every plastic material that needs to be recycled.

5.2 Technology

At the time of buying a product, the vendor will scan the barcode on the product and the information on the barcode (deposit fee, customer details, vendor details, product details) will be uploaded to a database over the cloud. At the time of disposal at the smart garbage cans, a barcode scanner will scan the barcode and access the database for the details associated with that unique barcode. The corresponding deposit fee will be dispensed from the smart can with a receipt. The database on the cloud server is updated simultaneously. The smart can employs a barcode scanner with laser technology using Charged Coupled Device (CCD) technique for reading the barcode. Material recognition techniques can also be used to distinguish plastic materials from other organic waste. The user needs to place the plastic material in a specific position so that the barcode is placed directly facing the barcode scanner. An Arduino kit can be used to help shred the plastic products into small pieces so as to maximize utilization of the space in the smart cans.

6. CONCLUSION & FUTURE ENHANCEMENT

The introduction that we defined earlier has thus been achieved and the following inferences can be drawn from them. Optimized segregation of plastic from other waste will reduce the probability of plastic waste ending up in Mumbai's water bodies and will be exempted from the fate of being burnt at landfills. Moreover, citizens will willingly pick up plastic from public places, streets, parks, etc and dispose them into the smart cans thus preventing littering. Plastic once recycled, can be reused multiple times. The deposit-refund system will indirectly help in reducing the air pollution in the city since very little plastic will end up in toxic fumes after scorching them in the dump yards. The governing body of Mumbai will find it easier to manage other waste after plastic is eliminated from it. Easy to track the plastic materials because of the unique bar code assigned to it as well as information of the buyer and seller of the product. Deposit- Refund system will save crores of rupees for the authorities that are otherwise spent on ineffective waste management policies and methods. Water channels across the city would remain free of plastic, encouraging the plant and animal life in water bodies to flourish and save costs of cleaning up these water bodies from time to time. Smart garbage cans must be installed at several places which could incur installation and maintenance costs. Users will have to place the barcode in a specific position for the scanner to read the barcode clearly.

With the same device which was used Scotland can be brought in india also which can help us to reduce the amount of plastic waste. Each piece of plastic may have to be printed with a barcode. That means even the inner packaging within a package must have a barcode.

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