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Managing Plastic Waste: A Huge Challenge

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ABSTRACT

Huge quantities of plastic waste are generated each day. Important strategy to consider in this regard is to rethink, rediscover, regenerate, reuse, reduce and recycle. The paper highlights the importance of retrofitting and redesigning of ways of usage in order to fulfill the objective of the study which focuses upon the ill effects of the waste creation and how one can rebuild ways of getting rid of the existing harmful phenomenon which can impact us in more harmful ways than we can even imagine. The study also elaborates upon the methods of using or reusing and how innovatively one can meet the challenging present scenario.

Keywords: Littering, plastic waste, linking recycling, solid waste management.

1. Introduction

Solid waste has reached an alarming situation most particularly the plastic which we emphasize in the paper because it is non bio-degradable. The consumption pattern of an average Indian consumer who consumes almost 11 kg of plastic in a year as against 109 kg consumed by an American does not highlight that our per capita consumption is low. However, if one can compare the population of US estimating figure 327,039,571 as against the population of India in 2018 which is 1,355,814,3451 one can easily infer that even when India's per capita consumption is low in comparison to the developed countries it is expected to rise year on year with already huge population increasing at a very fast rate every second. Therefore one is in a stage and time to make some attempts to address the problem of waste collection and its adverse harms [1].

A polymer is a durable material which is also bendable, light and relatively torpid. The first synthetic polymer, or plastic was created in the early 20th century. Since that time, contemporary alchemists have been cutting up and redesigning the hydrocarbon molecules

into thousands of materials that configure the family of plastics. As one counts today everything is plastic today whether it is bottle or one see money turning into plastic too.

This has become a true magic material which possesses its conflict side as well as plastics has its innate inability to decompose naturally. As the facts and analysis indicate that they are embedded in quite literally every habitat in the world even if for instance any isolated ecosystem. One of the living examples is the Great Pacific Garbage Patch (600-sq km floating island of plastic waste) in the North Pacific Ocean. As one look around more one speak less about in especially our developing world on observing hundreds and thousands of landfills, drains and rivers choked with plastic waste. Apparently another worrisome side that gains our immense attention is the minute particulate plastics, or micro-plastics. The exposure to ultra-violet solar rays, water and salts, plastic is capable of deteriorating and fragmenting into miniscule particles. They can be ingested by simple life forms and enter the food chain. These micro plastics come in form of several consumer products being manufactured. As

the unmitigated situation reaches its fever pitch level with the alarming situation crossing its new heights every year, it wouldn't be difficult to address the theme of Plastic Pollution on every World Environment day 5th June. This year also the same theme is addressed undoubtedly [4]. As one observe India's own track record for managing plastic waste one raise more doubts about its proclamation.

According to a report in 2017 September by the Central Pollution Control Board (CPCB), which extracted data from 60 major cities, it is indicated that about 25,940 tones of plastic waste is generated each day in our country. As per the findings the composition of thermoplastics, such as PET (polyethylene terephthalate) and PVC (polyvinyl chloride), which is recyclable, has a 94% share in the available plastic today. The remaining belongs to thermoset and other categories of plastics, such as sheet molding compound (SMC), fiber reinforced plastic (FRP) and multi-layer thermocol, which are non-recyclable. According to the latest report of Plastic Waste Management Rules published in 2016, on the Implementation of the plastic waste generated across the country (barring six states where data was not available) is close to 1.6 million tons a year, with almost half of it coming from Maharashtra and Gujarat. However, the volume of plastic waste generated seems suspiciously low when compared with the data of Plastindia Foundation a body of major associations, organizations and institutions connected with plastics. The Foundation estimates that in 2017-18 alone, India consumed 16.5 million tones of plastic. Worse, according to industry body FICCI, 43% of India's plastics are used in packaging and are single-use plastic. Consumption has clearly outstripped India's capacity to recycle [10, 5].

2. Plastic : Opportunies and Initiatives

One must emphasize on most of post-consumer plastic waste to be incinerated with energy recovery, and the rest should either be land filled or recycled. The provisions of most treatment plants should be laid where the waste can be collected in organized ways and means

should be discovered to treat most of the waste as about half of the plastic waste is collected and recycled and treated in the European Union; the other half is exported, mainly to China. A very good such contribution was made by Government of India through an order in November 2015 also made it mandatory for all road developers in the country to use waste plastic, along with bituminous mixes, for road construction. This is to help overcome the growing problem of plastic waste disposal in India. The technology for this was developed by the 'Plastic Man' of India, Prof Rajagopalan Vasudevan, Professor of Chemistry at Thiagarajar College of Engineering, Madurai.

The plastic material is cheap, durable and versatile and this fact cannot be denied that it gives us multiple benefits but its flipside has a monstrous view. Many initiatives and measures are required in five priority sectors. In the action plan a pledge is specifically to be undertaken for the following actions:

- Developing a sustainable plastic strategy in the circular economy.
- Taking focused actions in order to reduce marine litter with a view to implement the 2030 Sustainable Development Goals.
- Putting effort in harnessing our actions globally in concern to international trade, multilateral actions upon plastic management worldwide.

Plastics are everywhere in our daily life: they are used in packaging, buildings, cars, electronics, agriculture and other sectors. Plastics production is 20 times higher than in 1960s, and is forecast to almost quadruple by 2050. There is an existence of a thousand kinds of plastic, around 90 % of plastic are generated from virgin fossils. An estimate of 6 % of global oil consumption is dedicated for generating plastics; by 2050, it is expected to reach 20 % by 2050.

The steps to change consumer behaviour and strategy development in order to curb the usage of plastic are gaining their appeal. The international initiatives are also proliferating to stop the use of single use plastic bags which are reflecting pan India appeal with great results worldwide. These should construe ban upon items like plastic drinking straws and the

best initiative so far being the implementation of deposit and return scheme of plastic bottles. One needs to introduce some of the best circular business plans and initiatives so that certain investments derives new technologies keeping our citizens and the atmosphere safe as well as the competitiveness in the industry is sustained as well where plastic waste is prevented in affecting our life as well as new stones of foundations are laid to give rise to more developments, competitiveness and high quality jobs to give new developments to global leadership in new technological development and materials. The plastic strategies will prove to be a win-win as they can develop and retrofit the products design, production, use and recycling. In the usual daily practices the production, use and recycling mostly fail to conquer the economic benefits of a circular approach. It is rather more harmful for the environment. Our aim is to lay a foundation for a new plastic economy where the reuse, repairing and recycling needs are addressed in a sustainable [2, 3]. One must place high importance upon leading the transition and set up a framework to cover each phase of the cycle which is able to measure the progress of the economy as the following strategies are mentioned below:

2.1 Linking recycling with profitability of the business

The development of the rules upon packaging and recyclability should be focused upon to improve the plastic recycling and its reuse. The emphasis should be placed upon collection, improvement in recycling facilities to scale up the process be set up, alongside a better and standardized system for the separate collection and sorting of waste across the country. This will save around a hundred rupees per tonne collected. It will also deliver greater added value for a more competitive, resilient plastics industry.

2.2 Restrict the plastic waste

Measures should be encouraged for significant reduction in plastic bag use. The new plans should be designed to restrict single-use plastics and fishing gear, supporting national awareness campaigns and determining the scope based on stakeholder consultation

and evidence. The measures to curb the age of microplastics in products, and fix labels for biodegradable and compostable plastics.

2.3 Curbing the littering at sea

New rules on port reception facilities will tackle sea-based marine litter, with measures to ensure that waste generated on ships or gathered at sea is not left behind but returned to land and adequately managed there. Also included are measures to reduce the administrative burden on ports, ships and competent authorities.

2.4 Introduce investment and innovation

The efforts must provide guidance for national authorities and businesses on how to minimize plastic waste at source. Support for innovation should be scaled up, along with financing the development of smarter and more recyclable plastics materials, making recycling processes more efficient and tracing and removing hazardous substances and contaminants from recycled plastics.

2.5 Spur change across the world

Effort must be done work with partners from around the world to come up with global solutions and develop international standards. One must continue to support others, as one has done with the clean-up of the Ganga River in India.

As one aims to have a cleaner environment, there is need to understand how and how much do one require to preserve the aesthetic value of the land. As the careless attitude of people belonging to India and most of African country do not care to be responsible towards the environment. The highlights are enough to convince us in getting to believe about avoiding or banning the plastic materials or if not such then retrofitting into the existing system. For such a step, one needs to first spread the awareness globally so that subsequently people realize the negative effects of usage upon environment as well as upon humans who needs protection against them. It must be understood that if one rethink of manufacturing plastic bags a lot of energy which one will save and it can be used to

boost other businesses to make some eco friendly or greener materials as we observe the production cost of plastic bags is very high as the production is itself not easy as the shelf life is hardly considerable therefore it's just a pain. The situation today is so alarming that we focus badly on the need to understand that 70% of municipal solid waste is either land filled or incinerated (Local Government Association UK 2007) and at this point we need to understand that such huge amount of waste can be effectively used as a fodder to produce bio fuels and renewable chemicals and how else do individual initiate and try to do their bit in order to be responsible towards our environment [6].

3. Challenges of the study

The management of waste is considered as very challenging for industrial, commercial and institutional sectors as the volume of the waste is huge and wide variety of waste is available besides that we need to have a proper solid waste resource management planning approach which demands a comprehensive strategy focusing upon the economic, social material including the product as well as packaging and the environment condition. Our main talking point is how we can divert the waste and somehow minimize it in an integrated plan under this the operational logistics shall play a key role in our study. The main considerations arise in the design process, plan implementation, monitoring and review. Then seeking the services provided by commercial waste recycling and composting service providers [3]. Today the most significant and impactful step we can take is that of reducing or recycling as it helps in reducing oil usage, carbon dioxide emission and quantity of waste requiring disposal. The plastics industry has developed considerably since the invention of various routes for the production of polymers from petrochemical sources. Plastics have substantial benefits and have become an integral part of our lives in terms of their low weight, durability, strength, design, fabrication facilities and lower cost relative to many other material types. The global polymer production estimates in 2016 are observed to be 335 million metric tons per annum for all polymers.

This indicates a historical growth rate of about 9 per cent p.a. Its application have not only been restricted to the packaging but also observed in automobile as well as in industrial development.

Recycling is considered as one of the best options in the solid waste management hierarchy to reduce the impacts presented by end of life (EoL) and end of use (EoU) post-consumer packaging plastic wastes. Other than contributing to municipal solid waste management by diverting materials which have economic value from the main waste flow, thus reducing quantities of waste to be collected and disposed [2, 3], recycling provides the opportunity to use recovered plastics to manufacture a new product [4,5]. Due to these reasons, recycling provides opportunities for recovered polymers to cascade through multiple stages throughout their lives hence contributing to sustainable manufacturing. Recycling is recognized as the "most environmentally sound" strategy for dealing with MSW following only the preventive strategy of source reduction and reuse indicated that recycling could be categorized as the most positively received type of solid waste management practice and as an essential part of sound waste management [6,7,8]. It is clearly a waste management strategy but can also be one current example of implementing the concept of industrial ecology whereas in a natural ecosystem there are no wastes but only products [9].

It is essential for us to understand that we contribute to conversion of Municipal solid waste and reducing the impacts of end of life and end of use effects and diverting the materials that can add economic value from main waste flows and recreating the existing waste as well as to fulfill the objective of sustainable development of ways and means in order to reduce the post consumption of plastic waste. twelve factors that influence sustainable recycling of MSW in developing countries; government policies, government finances, waste characterization, waste collection and segregation, household education, household economies, MSWM administration, MSWM personal education, MSWM plan, local recycled material, technological and human resources and land availability The identification of broad group of drivers for

development in waste management can be attributed to Public health, environmental protection, resource value of waste, institutional and responsibility issues, closing the loop and public awareness. For a community to address the issue of retrofitting there exists a number of challenges that points out our system in form of twelve factors which are influencing sustainable recycling of MSW in developed as well as developing countries which can be attributed to government policies, government finances, waste characterization, waste collection and segregation, household economies, MSWM administration, personal education & plan, local recycled material, technological and human resources and land availability which forms a framework of solid waste management, the legal drivers, technology development and institutional drivers, regional and international drivers and socio-economic drivers conducted a research on identification of waste management development drivers. The fact that waste was considered as a valuable resource, it is important for municipalities. From the economic sustainability view, waste is being considered as valuable source of study. The fact that this understanding also carries a responsibility for municipalities to value the waste and carry on their responsibility in the best possible way as in converting the post consumption plastic waste into a valuable reusable product. When the community and the households value waste as a resource, the introduction and implementation of recycling programs and systems is possible. It has been reviewed that rapid climate change and Environment have been considered as drivers in environment when considering SWM. It is very essential in today's time that the Post-consumer wastes should be looked upon as opportunities and more and more awareness should be spread to educate the community and households regarding further development of sustainable recycling systems. Further analysis of the studies indicate that, producer responsibility, consumer responsibility and rules and regulations have been identified as drivers to sustainable development of SW management systems from the economic, environmental and social aspects. It is also very detrimental that the Producers and consumers of plastic wastes should be responsible for the management of these

wastes but the fact that unless the rules and regulations are framed and the entire executional effectiveness of the system is fixed, such responsibility cannot persist.

4. Methods of retrofitting in the environment

The idea of recycling came into existence when Environmental revolution came into existence in late 1960's this idea can be construed as old as the belief of a mankind when the first mother gave her younger child worn out clothes of his sibling. Likewise such a concept can also be put in today's time to leverage upon the existent unless exhausted.

The flipside of the plastic recycling is that its procedure is very cumbersome involving a very long process from sorting the items to chopping them into small pieces and chunks then cleaning the dirt or removing the smallest of the contaminants and then recycling the plastic in its former self. Plastic recycling in a nutshell is fraught with flaws as one batch of contaminated plastic can cause an entire batch to get scrapped thus only 10% of actual number of plastics is only returned for reuse

When we talk about retrofitting our ways we have to come over the myth of believing that just about any plastic can be recycled because it is not true and moreover if two types are mixed one has the ability to contaminate the other thereby affecting the value of the resource therefore we must learn to separate resources before processing as for example plastic lids and plastic containers don't mix. The idea of our redevelopment also emphasizes on the extent of harmful effects posed by the plastic and it is much safer to avoid it or rather just restrict its use or completely shun it as it is believed a better idea to throw the plastic caps and lids into the bin rather than disrupting the production process as they pose a huge safety risk for recycling workers as the most tightly fastened lids can explode when the temperature increases. It has been considered fruitful that when we buy in bulk we perform responsibly as there would be less consumption at your level and the excess of single serving creates more waste. The same kind of approach can be taken with many if not all of the

bottled and canned grocery items we buy routinely for our homes. If more people bought in bulk, apportioning out of fewer, larger containers, we could take a huge bite out of what goes into the waste stream.

The idea of up cycling is also not bad especially in today's time of crisis of global warming and harmful impacts of climatic condition. The smallest of the contribution in realizing complete discard of tracings of synthetic fibers in clothes one wear. The disposal of tableware's should also be used responsibly considering end of life impacts. The aim to repairing or upgrading of our electronic devices is not possible in today's demanding times although but is the only solution one can offer rather than turning to purchasing a brand new phone and piling up the unnecessary waste without knowing how to get rid of already piled up [7,8].

The plastics processing industry has grown at a CAGR of 10% in volume terms from 8.3 MMTPA in FY10 to 13.4 MMTPA in FY15 and is expected to grow at a CAGR of approximately 10.5% from FY15 to FY20 to reach 22 MMTPA. The recycling initiatives can be seen in myriads of industries such as automobile many parts of car manufacturing, bags, Luggage, T-shirts, and many more items. The main source of knowing whether it's a recyclable plastic is the symbol with number "1" inside it mentioned. The awareness shall be very helpful in knowing about what types of plastics are really recyclable and shall be worth doing it without spreading harmful impacts to the environment in such case one can contact the recycling centers around us. As one turn around one see PET, a very common type of plastic which conveys one have umpteen number of opportunities and one must encourage in our own little ways to open up new innovative and creative ideas for our kids to open and use such products in making some creative items as one can come across huge ways as one browse and that's how one can touch lives in no. of ways. The reality can't be escaped that none of us are an exception of being in touch with plastics in number of ways but one all must act responsibly towards the young generation in variety of ways as its really inhuman to let play little infants with toxic toys it is prudent on our part one avoid them and if one buy one

must find out the variants of additives present their composition structure and related specifications that can't be risked to ignore as the studies highlight that long ago the composition of toys, baby bottles, dental sealants and some more such items was made of biphenyl A- usually BPA which poses risks of obesity, depression as well as breast cancer. One must be alert when buying plastic items which are marked with "3" or "PVC" because polyvinyl chloride plastics often contain additives that make the plastics more harmful especially when concerned with toys and the volume of usage vary from object to object differing from toy to toy. The lesser one buy PVC in our day to day lives the lesser one get exposed to dioxin a byproduct of in the manufacturing process which is considered as a serious carcinogen therefore one must all act in environmentally smart ways. When concerned with European countries and US they slapped a ban on plasticizers long ago as the traces of very harmful compounds have been found that are pliable enough with the toys. The research predicts that in order to soften the toys lead is being added to the plastic which is terribly harmful even when inhaled by child or pet. One has to pay a lot of vigilance in our daily lives to act safe and responsibly since this paper focuses on monitoring the solid waste but first the focus must be placed upon the manufacturing pedagogy and then keeping a check on our consumption patterns since these manufacturing and business houses exists because of possibilities and opportunities one give them and when one start to spread awareness on our own then that day is not far when such selfish interest pursuing business will fall prey to shutdown.

The wise ways of addressing the issue of carcinogens spread all across our environment is by identification of brightly colored, shiny, very impact resistant objects regardless of such or any type of plastic one may come across in our daily lives one must maintain to discard or recycle the worn out or degrade plastics since their exposure is way much harmful. This is so deniably true in modern age that plastic is immensely ubiquitous as one is growing, eating and wearing plastic i.e. eating in form of the crockery, cutlery or utensils of much

glorified Tupperware or melamine, wearing in form of polyester/cotton mix garments or even spectacles or watch with plastic components. The importance is the highlighting proposition which is placed upon durability and maintenance which is such a convenience that nothing bulky even when organic or eco friendly appeals. Another major challenging is that of disposal as in their existence period their harm is known and when it comes to post consumption end of life period its incineration is as harmful as landfills because the toxic released either pollutes air in former and land in latter. One is getting wiser though and now many plastics can be chemically, mechanically or thermally treated and recycled [9, 10].

It is astonishing realization that our eyes exhaust at plastic vision which is surely not a delightful incidence as huge percentage of plastic in our televisions, sound systems, cell phones vacuum cleaner, furniture, floor covering, clothes, chair tables, plastic plumbing items, kitchen items, then when one open our refrigerators one witness PVC cling films, yogurt curd and milk in plastic made packs, water bottles soft drinks, concentrated juices, medicines all wrapped into plastic how logical is our life. The observation leads to a realization that somewhere one all living a plastic life it's time one revise our methods so that one do not lead to our complete destruction.

5. Conclusion

As per our research study we can come to one conclusion that any kind of effort can be contributed in order to save our environment. Plastic recycling has no doubt come a long way since the initiation and it continues as the awakening and realization is taking place. It is very surprising that in the race of following the new technology in form of better convenience we are switching and moving towards the developments which are somehow very harmful for us as well as environment but despite being so educated we are not discarding them nor raising any voice against them for instance our shift from glass, paper and metal products to plastic containers is nothing short of an irony where former were recyclable and despite the latter is unrecyclable hence we made such

drastic lifestyle choices.

Many municipal recycling programs throughout the United States still do not accept plastic lids, tops and caps, even though they take the containers that accompany them is because the adverse effects of plastic are plenty and we need to overcome them in form of awakening ourselves and looking for the healthier and better alternatives. Waste problem is not the fault of only the producers rather the economy is responsive to the wastefulness from top to bottom level. The top level possesses unlimited greed whereas the lower stratum is full of lazy and passive attitude, that the self indulgence becomes a prime motive. Therefore we can conclude that top to bottom all the parties are partners in crime it shall be better if the parties focused in a positive direction to lead a better life.

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