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A Review on Development plan for Solid Waste Management of an Institution Buildings: case study of NITTTR Chandigarh

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Abstract - *With the evolution in technology, the materials have become more and more complex. The nature is no longer able to break down these materials, resulting in generation of waste. Due to population growth, industrialization, rapid increase in urbanization and with changing consumption patterns and rapid economic growth, it is estimated that urban municipal solid waste generation will increase to 165 million tonnes in 2030. Developing countries like India are lacking behind in SWM from the developed countries which are using advanced technologies along with efficient management. Lack of awareness and improper collection, imprecise segregation, exposed transportation, inefficient processing and disorganized disposal of solid waste are the major reasons for it. Allowing the current situation of waste management to persist will lead to a rapid deterioration in quality of life and environmental sustainability. We must act now to preserve the world for future, for human beings and help the poor to live a better life. Higher Education Institutions like NITTTR can act as a model for Solid Waste Management (SWM) in order to develop a framework for sustainable development in future.*

***KeyWords*: Solid Waste, Sustainable, NITTTR, Types of wastes, RDF, E-Waste, Recycling.**

1. Introduction

The discarded or thrown away things because they can no longer be of any use to us or they might be unwanted, defective, old or worthless and such objects which are no longer of any use to us are called waste. Waste is an economic loss as well as an environmental problem. The components of waste are resources, not waste. This free product can become a raw material for making another useful product. Waste may be also termed as trash, garbage, refuse and rubbish. Indian home comprises 60% - 80% is organic waste, 20% is recyclable, 10% is toxic and 10% is reject waste which may be the part of a landfill site. If the waste management is right then it means only 10% waste ends up in landfill once in a few days.

1.1 Sources of Waste

i. Domestic Waste - "Domestic waste" is any putrescible waste, consisting of combustible materials, such as cardboard, paper, tree leaves, wood, or similar materials, generated in a dwelling

ii. Industrial Waste - Industrial waste is any solid, liquid, and gaseous waste. It is the end product which results from the manufacture of goods.

iii. Biomedical waste - This waste may contain any kind of waste of infectious materials.

iv. Agricultural Waste - This waste is defined as unwanted waste produced as a result of agricultural activities (i.e., manure, fertilizer, herbicides and pesticides, oil, silage plastics, wastes from poultry houses, farms, and slaughterhouses, veterinary medicines. Globally this waste production is more than four and a half times that of municipal solid waste. Agricultural waste, largely organic may be beneficial for future agricultural activities therefore it is often managed separately from other waste streams.

v. Animal Waste - This waste is the excreted materials from live animals. After recycling animal waste the manure produced can be used as fertilizer for crops.

vi. Nuclear Waste - Nuclear waste is the radioactive waste produced by nuclear reactors, medical uses or left over from research projects and the manufacture of nuclear weapons.

2. Literature Review

Gupta, S. et al. (1998) [1] In India uncontrolled dumping of wastes on outskirts of towns and cities has created overflowing landfills, which are not only impossible to reclaim because of the haphazard manner of dumping. but also have serious environmental implications in terms of ground water pollution and contribute to global warming. Burning of waste leads to air pollution in terms of increased TSP and $PM_{2.5}$ emissions which is equivalent to vehicular emissions. In the absence of waste segregation practices, recycling has remained to be an informal sector working on outdated technology, but nevertheless thriving owing to waste material availability and market demand of cheaper recycled products. Paper and plastic recycling have been especially growing due to continuously increasing consumption levels of both the commodities. Composting-aerobic and anaerobic, both the options are available to the country for scientific disposal of waste in future. However, country also needs something in terms of policy and

guidelines to enable the municipal corporations to run the waste services efficiently.

Sivertsen, B. (2006) [2]As part of the air quality monitoring and assessment, emissions from the open air burning of waste and biomass have proven important sources of impact on the population exposure. The emissions of a variety of air pollutants from different types of open-air burning have been evaluated. Simple model estimates are used to estimate the impact in areas downwind from backyard burning. Different models have been used to estimate the importance of impact and the reasons for odours detected downwind from waste dumping areas. Data from Cairo and other major cities have been used to estimate the impact of emissions from agricultural waste burning. In several urban areas especially in developing countries the contribution to the PM exposure has been demonstrated to range between 30 and 50% dependent upon weather conditions. The design and application of combined monitoring programmes and models may be part of the systematic evaluation of impacts and optimal control of the sources.

Vega C. A. de (2008) [3] Although there are a number of benefits of a suitable waste management system, it is not an easy task of setting of a new waste system.For sustainable development, integrated waste management systems are one of the greatest challenges. This study was carried out for implementation of a recovery, reduction and recycling waste management program at the campus of Autonomous University of Baja California (UABC).A program for segregation and recycling was shown feasible on a University Campus in the results. Some strategies to reduce waste at the source were discussed. It was showed that the waste such used paper from the UABC could be reutilized. The larger proportion of waste is found in the recyclable and potentially recyclable categories which, as a whole, represent 55%in the case of buildings, 88% in the case of gardens and 85% in the case of the community center. The local recyclables market can absorb the portion of waste considered as recyclable. The portion in the potentially recyclable category could have a different destination other than the disposal in sanitary landfills.

Narayana T (2008) [4], The world has become aware of the need that recovery is fundamental to sustainable development in a world limited by resources. Without active citizen participation and proper implementation of regulations a recovery-centric approach to municipal solid waste management cannot be functional. Small experiments have shown that it is possible to achieve a recovery-centric approach by altering citizen behaviour. Based upon the results of the paper the author concluded that composting after segregation is the best possible option to address solid waste in developed countries. Although this conclusion is nothing new, the successive governments in India have not worked towards the establishment of composting plants, but have time and again experimented with the different technologies available. There have been instances where the Indian government has established composting plants like Villapilsala in the Trivandrum district of Kerala, but the plants have failed due to the lack of streamlined collection of waste by the municipality. The lack of involvement of civil society in the management of municipal solid waste is a major problem. Municipalities should see to it that private participation is made attractive. Awareness campaigns should also be conducted so that the burden of the corporation for proper segregation of waste would be lessened by the participation of the people and recovery at the household or industry level.

Pradhan U.M. (2008) [5] The study recommends that **t**he sustainability of any solid waste management system depends upon the factors such as Public consultation and involvement, set targets and goals, creation of three waste stream system, collection of waste, promotion of reduction, reuse and recycle, composting, waste disposal in scientific manner, responsible bureaucracy, development of long term plan, final thoughts. Consultation can be achieved through participation of the general public or through a body selected, elected, or appointed by the people at the ward level. Littering in all forms should be discouraged, and people who litter should be made liable for legal action. Education, awareness and information sharing regarding solid waste issues, should be made a priority. People should be made a part of the solution. Certain indicators should be developed to monitor the progress. For instance, no plastic bottles being thrown in the garbage could be an indicator of success in terms of recovering recyclables. Long-term sustainability of the solid waste management system also depends on the level of segregation of waste in three stream i.e. bio-degradable, recyclables and garbage/waste. This will also help in finding appropriate disposal options. Community level composting can be undertaken at the local level which will save money and resources.

Shekdar A. V. (2009) [6] Everyone – from commodity manufacturers and service providers to international policy makers – is using the term ‘‘Sustainability” in one context or another. It is unclear whether all of these stakeholders understand the term ‘‘sustainable development” to mean the same thing. It has been estimated that current rates of resource extraction are ten thousand times higher than rates of natural resource generation. In the foreseeable future, there is a little chance that this proportion would change significantly. Moreover, it is unclear whether SWM can contribute in a meaningful way. Accordingly, it would be best to develop sustainable SWM rather SWM for sustainable society. The SWM system should be compatible with both the financial capacity of a given society and with the assimilative capacity of its adjoining environment. The Asian continent is a mixture of complex cultures, a mix that is truly reflected in the MSW systems. Countries like Japan showcase a sustainable approach through MSW management. Meanwhile, countries like China strive to meet new demands arising from aggressive development. For every nation, solid waste management is a vital, ongoing and significant public service system that needs to be efficiently delivered to the community to maintain aesthetic and public health

standards. Municipal agencies must plan and operate the system in keeping with increasing urbanization and population growth. Today, Asian countries have the potential to demonstrate sustainable SWM systems through an integrated approach. A systematic effort is necessary to improve various factors, including policy and legal frameworks, institutional arrangements, financial provisions, technology, operations management, human resource development, and public participation and awareness of ISSWM systems.

Memon M. A. (2010) [7]In this study the author carried out understand the evolving concept of ISWM based on 3R and the process to implement ISWM system in cities/towns. ISWM system, based on 3Rapproach, clearly improves the resource-use efficiency, as all the waste sources are managed under an integrated waste management system. This is crucial for managing special wastes, such as hazardous waste. If individual sectors are managed separately, then it would be a costly business. Hence, putting joint efforts, under ISWM, could be efficient and effective. This is a major challenge for cities. Furthermore, resource recovery from one sector, such as commercial sector, may not be substantial to attract investments in eco-industries or to convert waste into a resource. Therefore, addressing all the sectors under ISWM could be a very effective tool to manage their waste effectively and efficiently based on 3R concept. Implementation of ISWM is straightforward as local capacity building, supported by national and international initiatives, can lead to undertake all the actions locally, including waste characterization and quantification, assessment of current waste management system, targets for ISWM,identification of stakeholders' issues of concern, development of ISWM Plan and implementation strategy for ISWM.

Meidiana C.,Gamse T.(2010) [8] Inadequate waste management law led to inefficient solid waste management in Indonesia. The current laws do not regulate specifically the solid waste management. Furthermore, the new Waste Management Law No. 18/2008 introduced in 2008 has not been implemented well causing low Level of Service (LoS) in waste management. The current practices focusing on 'the end-pipe-approach' bring about the problem in final disposal site. Many cities are facing the problem of overburdened landfill because of limited land availability and open dumping sites equipped no sanitary system, such as soil cover, leachate collection and treatment system polluting the environment through CH_4emission and leachate intrusion into ground and surface water. Waste management improvement is required because, based on comparison data between data from UNEP and the author's compilation, only one indicator of waste management aspects which was not fulfilled in 2004 has been realized in 2008. The study showed the development of some indicators of waste management aspect in Indonesia. It shows that from 10 indicators of municipal waste management aspects, 4 aspects has been adequate since 1999 and only one aspect was improved after the UNEP evaluation. The training program for capacity building in municipal waste management has been provided by The Ministry of Environment and The Ministry of Settlement and Infrastructure. Therefore, the efforts to improve the above indicators should be initiated by viewing the inferior condition as a challenge and use the potentials to develop them. In addition, the enactment of new waste law introduced in 2008 can be a mile stone for the waste management development in Indonesia which can encourage the national and local government to implement a better waste management.

Zaman A. U., Lahman S. (2011)[9] To prevent further depletion of global resources, sustainable consumption and a strategic waste management system would be required. A simultaneous and harmonized application of sustainable behaviour and consumption, product stewardship, a 100%recycling and recovery of resources, legislated zero landfill and incineration are required to transform current city into a zero waste city.

Annepu R.K. (2012) [10]This study examined the present status of waste management in India, its effects on public health and the environment, and the prospects of introducing improved means of disposing municipal solid waste (MSW) in India. The systems and techniques discussed are Informal and Formal Recycling, Aerobic Composting and Mechanical Biological Treatment, Small Scale Biomethanation, Refuse Derived Fuel (RDF), Waste-to-Energy Combustion (WTE), and Landfill Mining (or Bioremediation).This report was the result of over two years of research and included data collected from the literature, communication with professionals in India, US and Europe; and extensive field investigations by the author in India and the US. Two field visits in India over a period of fifteen weeks covered 13 cities representing all sizes and regions in India. The visits included travelling to informal recycling hubs, waste dealers shops, composting facilities, RDF facilities, WTE facilities, sanitary and unsanitary landfills, landfill mining sites, and numerous municipal offices. These visits provided the opportunity to closely observe the impact of waste management initiatives, or lack thereof, on the public in those cities. The author has also visited different WTE plants in the US to study the prospects of this technology in India. Materials and energy recovery from wastes is an important aspect of improving SWM in India. It not only adds value to SWM projects and makes them economically feasible but is also more sustainable. The author has suggested further research in Solid Waste Management, its impacts on public health and environment, and prospects for the future should be carried out.

KaushalR. K.et al. (2014) [11] This paper, attempted study on the changing trends of quantity and characteristics of MSW to find its impact on the performance and capacity planning of recovery/recycle, compost, incineration and landfill facilities. Due to changing pattern of waste composition, the segregation is very important for successful operation of waste management facilities. Municipal authorities should maintain the storage facilities with sufficient hygienic and sanitary conditions. A new survey

should be carried out on the generation and characterization of MSW in India. Since the MSW is heterogeneous in nature, a large number of samples have to be collected and analyzed to obtain statisticallyreliable results.

Ravindra K.et al.(2014) [12] Efficient management of municipal solid waste (MSW) is a challenge to municipal authorities due to rapid urbanization and population growth. The study has confirmed that no attention is being given to the major waste fraction i.e. organic matter. System analysis of waste indicators shows that various indicators Refuse Derived Fuel (RDF) production, common collection points),may be effective for general waste management, but the most effective indicators (organic fraction of waste, livelihood and health concerns of waste handlers) are not systematically included in the policies framed in the city. These issues can have major implications for environmentally sound waste systems therefore, there is need to regulate operational activities and closely observe the decision-making process. It is suggested that the new frameworks should be framed focusing mainly on the properly design integrated waste management system as suggested with high recovery rates, cost-effectiveness, reducing the carbon emissions and other environmental impacts. Further, an attempt should be made by the stakeholders to formally organize the informal recycling activities.

Zaman A. U.(2014) [13] This study is useful to the policy and decision makers in developing the evidence based zero waste guidelines.Zero waste is a holistic approach to tackling waste problems in the twenty-first century. Based on the review of the literature, thisstudy concludes that zero waste is still in development. Professionals have proposed various ideas, plans, policies, and strategies and have implemented them in cities to achieve zero waste goals. However, we need to redevelop the holistic ZW strategy in regards to its implementation practices and practicality. At this moment, ZW strategy is targeted toward zero landfills through diverting waste from landfills. However, the study acknowledges that achieving a 100% diversion rate is not currently possible in production, consumption and waste management systems in our society. We require a universal transformation of existing extraction,production, marketing, consumption, management and treatment systems. Therefore, studies on how to transform existing systems into ZW systems are important for moving towards ZW goals.

Rana R. et al. (2015) [14] Chandigarh city produces about 370 tons/day of solid waste. Inadequate solid waste collection and mixed waste fractions are the major problems being experienced by the Chandigarh Municipal Corporation. It was suggested that daily door-to-door collection of waste would be done. Horticulture waste would also be collected separately as it serves well for producing RDF and is difficult to segregate it from the mixed waste fraction. Vehicles owned by the corporation are inadequate in number with no proper route mapping. It was observed that Public-private partnership has proven to be one of the biggest achievements for a better solid waste management system that could be successfully implemented in other cities. The waste-aware benchmark indicators for Chandigarh show very poor performance in environmentally controlled waste treatment, disposal method of waste and the 3R methodology in comparison to Surat (tier-II city) in India.

At present, solid waste is processed to generate RDF and no additional treatment is provided to the waste. The present landfill site has no proper lining system to control the percolation of leachate in the groundwater. A new engineered sanitary landfill has been proposed for better management of solid waste including control of leachate. Municipal Corporation had planned to install biomethanation plants which will process the organic waste generated from the vegetable market, and hotels and the methane gas so generated will be utilized to generate electricity.

Dawane P.S. et al. (2015) [15]The generation of waste increases with increasing population, industrialization and urbanization. Solid waste management is one of the difficult threats in front of world, the change in habitats of people, rapid development are responsible for large generation of waste, in India cities like Delhi & Mumbai are generating more than 5000 MT of waste per day. This waste is creating problems to public health, drainage, aesthetics, of the cities, so there is intense need for efficient waste management systems in the city as well as villages. In this study the author concluded that the waste management system should adopt Proper collection, storage, processing, transport & disposal of waste so that the impacts of waste can be minimised & the quality of life can be improved

Ma J. , Hipel K.W. (2015) [16] Effective and efficient MSW management is a deciding factor for future social development, which requires not only technical innovation, but also the involvement of all stakeholders as well as social, economic, and psychological components A new trend for MSW management is to establish an integrated system that involves all stakeholders, including government, the private sector, non-government organizations, and the informal sector, as well as sharing MSW management responsibilities among them. Therefore, integrated management has become the new trend in MSW management and is necessary to ultimately achieve the goal of sustainable development. The research has addressed several potential risks to vulnerable populations from MSW i.e. on health, economic/wage inequity, environmental injustice, and inequity in service provisioning. Among them,health risks to children were investigated most. The author suggested further research is needed on other types of risk.

Keisham S. et al. (2015) [17]Municipal solid waste management is a national problem and is being faced in all the cities of India. It can be very safely concluded that MSWM system in India is unsatisfactory. Although the economic condition of our country is poor, we have to handle the problem for the benefits of the whole public. To tackle the problems with maximum possible effectiveness, the country should develop area-specific solutions to their problems in

the management of MSW. Most importantly we cannot ignore the fact that the country is progressing towards developing sound institutions and proactive policies regarding MSW. The way forward is to build on the strengths and work on the weaknesses of the current system. This analysis suggests a number of priority actions to move towards an increasingly integrated and sustainable MSWM system in India:

- During segregation of MSW, the collection of organic waste, which comprises 60% wt. of MSW, for either composting or anaerobic digestion should be encouraged.
- Increasing recycling rates and maximizing diversion of waste from landfill disposal, by introducing effective schemes to integrate both NGOs and the formal and local sectors into MSWM practices and to raise public awareness on the importance of recycling.
- Focusing on waste reduction and recovery.
- Integrating all stakeholders, and encouraging full community participation in the planning and implementation of MSWM practices.
- Developing an improved data collection and management system by the concerned authorities, so that future planning is based on sound data.
- Regular activities such as clean-up of the neighborhoods, schools, parks and roadsides can be effective in changing the ''NIMBY'' attitudes even among the poor communities.
- Drawing sponsors from Ministry of Environment, Forests and Climate Change (MoEF&CC), Ministry of New and Renewable Energy (MNRE Ministry of Health, NGOs and various private organizations.

Jain P., Gupta C. (2016) [18]21st century world specially developed nations are worried about polluted environment and there adverse effects on nature. There prime concern is to seek various environment friendly ways for better present and secure future. Sustainability, recycling, corporate social responsibility, extended producers responsibility, circular economy theory is some of the very modern concepts to overcome the problem of pollution and wastes.Many industries and research institutes have taken this concept on a prime importance and trying to find out more and effective alternatives, especially in developed nations. Even industries are keen to search and produce ecofriendly products followed by strict environment related government policies to save the nature. In developed nations like India, the concept of sustainability is at infancy phase although door to door SHC(Second hand clothing) collection by Wagdi community in exchange of utensils and words biggest textile recycling industry (shoddy industry of Panipat, Haryana,) is situated in India. These different small- and large-scale textile recycling-based businesses are practiced for the livelihood not for the sake of environmentalism. In India, along with shoddy various pre and post consumer textile wastes recycling activities at both industrial and household level are practiced since long. Due to lake of awareness, government support and very low economy in last few decades, these recycling based various organised and unorganised businesses are losing their profit, identity and charm instead of get
promoted and encouraged for the sake of environment.

Kolekar K.A. et al.(2016) [19] Development of a Municipal Solid Waste Management (MSWM) plan is a complex process. Quantification and prediction of Solid Waste (SW) generation is very much essential for efficient Municipal Solid Waste Management Plan. It has been noticed that the physical and chemical components of MSW depends upon a number of factors such as food habits, standard of living, degree of commercial activities, seasons etc. where the total MSW generation depends on total population. Effective collection and proper disposal of MSW depends greatly upon accurate prediction of generation of solid waste (Chang and Lin, 1997). MSW prediction cannot be made directly and depends on many qualitative and quantitative factors. Due to uncertainties and insufficient data availability, modeling methods were found to be beneficial.A review of models on solid waste generation predictions showed that the overall size of the household, income level of households, and the level of education are most common attributes affecting the generation of waste. There is lack of official historical records of attributes affecting solid waste generation (both qualitative and quantitative) especially in developing countries. Since level of association between each of these attributes are not always same. So predictor in one level need not necessarily be a predictor in another. These are the main limitation on prediction of MSW generation. The entire published models are diverse in nature for application from county to households. Successful modeling is dependent significantly on selection of waste stream. Most of the models were based on correlation and regression analysis.Very few attempts have been made on artificial intelligent systems like fuzzy logic.

Gundupalli S.P.et al. (2016) [20] In this paper the author reviewed recent advances in physical processes, sensors, and actuators used as well as control and autonomy related issues in the area of automated sorting and recycling of source-separated MSW. A large body of literature has been reported in the area of automated industrial level sorting systems targeted for source separated MSW in a regulated factory environment. A need to deal with mixed waste in large landfill sites in developing countries is opening up new research challenges for the development of robotic systems that can efficiently perform autonomous waste sorting.

Mani S., Singh S. (2016) [21] The author has pointed out that segregation of waste, door to door waste collection, technologies for the treatment of waste, land resources and scientific disposal methods are some of the major challenges in India. Due to huge quantities of waste generated Municipal Solid Waste Management (MSWM) has emerged as a big challenge. To deal with these challenges, the two ministries of Government of India namely Ministry of Environment, Forest and Climate Change and Ministry of Housing and Urban Affairs (MoHUA) have initiated several policies and programmes to improve the current scenario of MSWM in India. It has been observed that many policies and

programmes fail to achieve their objectives due to lack of clarity and awareness among the stakeholders and poor enforcement by the regulators. The author has provided a comprehensive view of SWM and most importantly highlighted some major points of the policies/programmes initiated by the Government of India to overcome the challenges of solid waste management in our country. Overall, the policy agenda for Sustainable Solid Waste Management (SSWM) needs to drive behavioural change among citizens, elected representatives and decision makers to minimize wastage and littering and maximize reuse and recycling. SSWM is a people management issue and over-emphasis of technological solutions to solving the SWM problem will only delay in realizing good results.

Cogut A. (2016) [22] Waste management is important as improperly handled waste can have devastating effects on both the environment of its surroundings as a whole, and on the health of people in places where poor waste management occurs.Waste is a debilitating environmental and health issue throughout the world. Various problems in waste management and collection worldwide can have disastrous health and environmental impacts due to air pollution, soil pollution, water pollution and food chain contamination. Open burning of waste is a practice that impacts health primarily as a result of the release of airborne pollutants, but also through other routes ofexposure. Whether open burning of waste occurs intentionally in residential areas,unintentionally in dumpsites, or as a result of poorly managed and unregulated incineration, it has disastrous effects on the health of communities around the world.Open waste burning's contribution to emissions of various pollutants, while unable to be precisely measured, can be estimated to be significant. In fact, open burning is indu primary source of some pollutants. The pollutants released by waste burning include well studied,harmful pollutants such as CO_2, methane, particulate matter and heavy metals and less understood, yet harmful, pollutants such as dioxins, furans and PAHs.

Joshi R., Ahmed S. (2016) [23]The abysmal state of and challenges in municipal solid waste management (MSWM) in urban India is the motivation of the present study. Urbanization contributes enhanced municipal solid waste (MSW) generation and unscientific handling of MSW degrades the urban environment and causes health hazards. In this paper, an attempt is made to evaluate the major parameters of MSWM, in addition to a comprehensive review of MSW generation, its characterization, collection, and treatment options as practiced in India. The current status of MSWM in Indian states and important cities of India is also reported. The essential conditions for harnessing optimal benefits from the possibilities for public private partnership and challenges thereof and unnoticeable role of rag-pickers are also discussed. The study concludes that installation of decentralized solid waste processing units in metropolitan cities/towns and development of formal recycling industry sector is the need of the hour in developing countries like India.

Pandey B. et al. (2016) [24] The characteristics of municipal solid waste (MSW) is a major factor, which considered as a basis for the design of efficient, cost effective and environmentally compatible and sustainable waste management system. Solid waste management system requires a great knowledge and proper attention about composition of MSW. In present study, the compositions of Bhopal municipal waste is estimated and analysis for better MSW management and energy extraction system. the study reveal that municipal solid waste is as a potential source of renewable energy that can be extracted from municipal solid waste to fulfil the energy demands several times of Bhopal city. Municipal solid waste management is one of major problems not only in Bhopal city but also whole India as well as whole world. The Study shows that the main component of municipal solid waste comprises the biomass material such as food, paper, wood waste, clothes rags, rubber, plastics, polythene, and other daily used discarded materials that dump out from each and every houses of Bhopal city. Various studies show that about 90% municipal solid waste is disposed of unscientifically and unmannered way in open dump places which create problems to public health, the environmental problems and distort the surround aesthetic beauty and causes the loss of sanitary and hygienic environment. In this paper an attempt has been made to provide a qualitative and quantitative measurement of solid waste produced in Bhopal city.

Nandan A. et al. (2017) [25]The generation of municipal solid waste is increasing in India due to industrialization, population growth, rapid increase in urbanization and per capita income. E-waste and plastic waste also contribute considerably to total waste stream due to utilization of electronic and other items. In efficient management of these wastes may cause a potential hazard to human health or environment. This study has concluded that despite the fact that Solid waste management practices has been improving in recent years, the pace of improvement needs to be accelerated. Measures mentioned in MSW rules must be implemented.

3. Conclusions

After study various research papers published by different authors following conclusions can be drawn:

- **A.** Properly disposing of waste is not just a personal responsibility, some kinds of waste, usually hazardous, must be properly disposed of according to law. Burning, burying and dumping of waste are the unscientific methods of waste disposal which will create conditions conducive for diseases.
- **B.** Unregulated dumping grounds pose a serious risk to the health of the environment**.** Toxic chemicals can leak from hazardous products and eventually find their way into water sources and soil. The burning of garbage also contributes greenhouse gases in the atmosphere, a major part of global warming theory.

C. Reducing pollution lowers the chances of respiratory illness, and cleaner water lessens the risk of drinking dangerous chemicals.
D. Society depends on natural resources for food, shelter and nearly every other aspect of life which are required to be conserved. The products we use each day are made using natural resources, some of which are non-renewable. For example, plastics, which make up 12 percent of municipal solid waste, are mostly made from petroleum.
E. Biodegradable waste can be used as manure in gardens and fields after composting.
F. Non-Biodegradable Waste i.e. a used product can be converted into a new item of equal or greater value by finding creative ways.

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