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Review Of Literature Related to Solid Waste Management

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Abstract

Solid waste management is defined as the discipline associated with control of generation, storage, collection, transport or transfer, processing and disposal of solid waste materials in a way that best addresses the range of public health, conservation, economic, aesthetic, engineering, and other environmental considerations. In its scope, solid waste management includes planning, administrative, financial, engineering, and legal functions. Solutions might include complex inter-disciplinary relations among fields such as public health, city and regional planning, political science, geography, sociology, economics, communication and conservation, demography, engineering, and material sciences.

Keywords: Solid, Waste, Management, Review of Literature

India:

Solid waste is the term used to describe non-liquid waste materials arising from domestic, trade, commercial, agricultural, industrial activities and from public services. Wastes that arise from a typical urban society comprise of garbage, rubbish (package materials), construction and demolition wastes, leaf litter, hazardous wastes, etc. If not managed properly, these wastes can have an adverse impact on the environment and public health arising from contamination of soil, water and pollution of air and through spread of diseases via vectors living on waste. The relationship between public health and the improper storage, collection and disposal of solid wastes is quite clear. Because of their intrinsic properties, discarded waste materials are often reusable and may be considered a resource in another setting. Ecological phenomena such as water and air pollution have also been attributed to improper management of solid wastes.

From the days of primitive society, humans and animals have used the resources of the earth to support life and to dispose wastes. In those days, the disposal of human and other wastes did not pose significant problems as the population was very small and the area of land available for the assimilation of such wastes was large. However, today, serious consideration is being given everywhere to this burgeoning problem of solid wastes. Rapid population growth and uncontrolled industrial development are seriously degrading the urban and semi-urban environment in many of the world's developing countries, placing enormous strain on natural resources and undermining efficient and sustainable development.

Waste is an unavoidable by-product of most human activity. Economic development and rising living standards in the Asian and Pacific Region have led to increases in the quantity and complexity of generated waste, whilst industrial diversification and the provision of expanded health-care facilities have added substantial quantities of industrial hazardous waste and biomedical waste into the waste stream with potentially severe environmental and human health consequences. The paper discuss review of literature related the generation, treatment, disposal and management of the growing volume of waste, which poses formidable challenges to both high and low-income countries of region.

Review of Literature:

Solid waste management has become one of a major concern in environmental issues (Mazzanti & Zoboli, 2008). This is particularly true to urban areas where population is rapidly growing and amount of waste generated is increasing like never before (Kathiravale & Mohd Yunus, 2008). Current earth's population is 6.8 billion and it is estimated that almost half of this population lives in urban areas (Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, 2009).

Waste generation increase proportionally to this population number and income, creating the needs of effective management (Mazzanti & Zoboli, 2008). Urbanization and industrialization leads to new lifestyles and behavior which also affects waste composition from mainly organic to synthetic material that last longer such as plastics and other packaging material (Idris et al., 2004). E-waste that barely existed before was generated as much as 20-50 metric tons a year (UNEP, 2006).

Rapid urbanization and economic growth are the main factors of increasing Solid Waste generation(Mian, M. M., et.all.,2017) and it has started gaining attention in the developing economies also.One of the major challenges in big cities is planning and implementation of an optimized, integrated solid waste management system(Erfani, S. M. H., Danesh, S., Karrabi, S. M., & Shad, R., 2017). In India also, Solid waste management (SWM) is now realized as one of the major environmental problems (Sharholy M. 2008) and without aneffective and efficient solid-waste management program, the waste generated from varioushuman activities, both industrial and domestic, is resulting in health hazards and having a negativeimpact on the environment.

In its scope, solid-waste management includes all administrative, financial,legal, planning, and engineering functions providing solutions to all problems of solidwaste. The solutions may involve complex interdisciplinary fields such as political science,city and regional planning, geography, economics, public health, sociology, demography, communications,and conservation, as well engineering and materials science (APO, 2004-05).

The Indian subcontinent displays vast diversity in its geographic area. It stretches fromthe snow-covered Himalayan heights in the north to the Deccan plateau in the south, IndoGangetic plains in central and eastern India, and Thar Desert in the west. It shares internationalboundaries with Bangladesh, Myanmar, Bhutan, China, India, and Pakistan. India has a coastlineof about 7,600 km. The total area of India is 3,287,590 sq km. The total land area is2,973,190 sq km, and 314,400 sq km is occupied by water. About 54.3% land is arable,2.66% of the land is permanently covered with crops, and 42.99% of the land is used for otherpurposes. Its climate is tropical and subtropical in south and temperate in north. The commonnatural hazards that occur in India are widespread and destructive—flooding by monsoon rains,drought, flash floods, and severe thunderstorms (Rajeev et al., 2009).

The intensification in the quantity of solid-waste production in India masqueradesa lot ofcoercion to the environmentand to professional health. The inappropriate and labourintensivemanagement of solid waste causes menace and relocating the waste in open vehicles createsfoul conditions. Discarding waste in low-lyingareas without liners, leach ate collection and treatment creates groundwatercontamination. The dumpingwithout treatment of solid waste into streams and rivers creates water pollution. Airpollution is produced by odour nuisance and the production of greenhouse gases largely fromthe landfill sites (Yadav 2021).

Waste is rather considered as a resource in the present time. The revival of this source is the main purpose of the system to function. There can be various ways and methods that seem to be gaining popularity as the developed countries are researching more and more on the same. Further their process is tried and tested in the developing countries. The traditional method was incinerating and land filling which due to the constraint of space and land and pollution isn't possible. Therefore the need for new and innovation is important (Dijkgraaf&Gradus, 2004; Ferrara &Missios, 2005). (Troschinetz&Mihelcic, 2009) (Idris, Inane, & Hassan, 2004).

The choices for solid waste management are becoming very important factors in competitive development (Beranek, W.,Jr., 1992; Sefouhi, L., Kalla, M., &Bahmed, L. 2014). Specific categories of solid waste include garbage, municipal solid waste, construction and demolition debris, and special waste such as coal ash, medical wastes, and rejected consumer products. There are several solid waste management options: 1. reduce waste generated, 2. reuse materials, 3. recycle waste products, 4. compost organic material, 5. combustion, and 6. landfill. Because solid waste management is important to business, economic developers should have answers ready for any questions a business may ask and should work to improve the local climate for solid waste management options (Beranek, W.,Jr., 1992; Craggs, R, 1995).With some of the above management options a series of serious repercussions follow leading to various other problems such as space occupancy, pollutions etc (Thanh, N. P., Matsui, Y., & Fujiwara, T., 2011). The involvement of political parties in deciding the policies has lead to a chaotic situation. As the role of every party is restricted to a duration of time. In some locations, the conversion of old quarries into well-engineered and controlled landfills appears as a promising solution to a continuously increasing problem, at least for many decades to come (El-fadel, M., Sadek, S., &Chahine, W., 2001).

Research shows that the generation of municipal solid waste in is highly correlated to the total GDP, per capita income, and the population (Xiao, Y., at.all, 2007; Yousuf, T. B., &Rahman, M., 2007).Some studies found that the waste generation of the households was significantly affected by environmental consciousness, income groups, particularly the middle-income earners, and willingness to separate (Afroz, R., et. all, 2011). "

Nnaji, C. C. (2015) in a study concluded that the rate of generation of plastics, water proof materials and diapers has assumed an upward trend. Due to the dysfunctional state of many municipal waste management authorities, many cities have been overrun by open dumps. Indiscriminate disposal of waste has also resulted in the preponderance of toxic heavy metals in agricultural soils and consequent bioaccumulation in plants as well as groundwater contamination. Disposal of solid waste poses great challenges to city managements. Changes in solid waste composition and disposal methods, along with urbanisation, can certainly affect greenhouse gas emissions from municipal solid wasteLandfill gas flaring, landfill gas utilisation and energy recovery in incineration are three techniques of the after-emission treatments in municipal solid waste management. The estimation in the reduction of the greenhouse effect 22.7%, 4.5% and 9.8%, respectively (Yu, Y., & Zhang, W. 2016).. Past research has identified the stakeholders or people or organizations that may have an interest in adequate waste management. In a recent study, the life cycle assessment tool was used to assess, from an environmental point of view, the different possible municipal solid waste (MSW) management scenarios. the results obtained indicates that landfilling has the greatest impact in all the analyzed impact categories except ozone layer depletion and human toxicity, while incineration has the least impact on almost all the analyzed damage categories except in global warming potential and human toxicity(Rajcoomar, A., &Ramjeawon, T., 2017).

In another study, the inefficiency of state to address solid waste problems was highlighted. The emphasis was laid on creation of local resources, execution of local codes, and commitment from central government to allow free exercise of existing policies(Dangi, M. B., Schoenberger, E., & Boland, J. J., 2017).

From a study of China, it is revealed that the source separation MSW collection, high energy recovery from incineration plants, appropriate leachate treatment, effective landfill location and management, increase waste recycling and proper taxation system for MSW disposal are essential to improve MSWM in China(, M. M., Zeng, X., Nasry, A. A., Naim, Bin, & Alhamadani, S., 2017).

Erfani, S. M. H., Danesh, S., Karrabi, S. M., & Shad, R., (2017) proposed an integrated model to optimize two functional elements of municipal solid waste management (storage and collection systems). The integrated model was performed by modelling and solving the location allocation problem and capacitated vehicle routing problem (CVRP) through Geographic Information Systems (GIS). Ranieri, E., et all (2017) presented the classification of solid recovered fuel from the municipal solid waste treatment plant in Southern Italy in compliancy with the EN 15359 standard. The solid recovered fuel produced meets the European Union standard requirements and can be classified with the class code: Net heating value (3); chlorine (1); mercury (1).

Li, J., He, L., Fan, X., Chen, Y., & Lu, H. (2017). In their study presented a synergic optimization of control for greenhouse gas (GHG) emissions and system cost in integrated municipal solid waste (MSW) management on a basis of bi-level programming. The bi-level programming is formulated by integrating minimizations of GHG emissions at the leader level and system cost at the follower level into a general MSW framework.

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