

SCIENTIFIC APPROACH TO WASTE MANAGEMENT: A CASE STUDY OF ERNAKULAM CITY IN KERALA

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Abstract: Given the vital need for addressing the ever growing challenge of solid waste management (SWM) in the State of Kerala in India, particularly in the industrial city of Ernakulam and its suburbs, this paper makes a preliminary study of the SWM scenario in Ernakulam District of the State focusing on the various Municipalities in the District and also Kochi Municipal Corporation (which covers the Ernakulam city), the paper gives some broad suggestions and necessary inputs for further focused studies on SWM in various parts of Ernakulam District. The suggestions include seeking the support of SHGs like Kudumbashree, ICT adoption, etc.

Key Words: Solid Waste Management, SHGs, Women Empowerment, MGNREGA, ICT.

1. INTRODUCTION

Various kinds of waste materials are created because of activities related to market, industry, agriculture, and households. These wastes are growingly becoming a chronic hazard for the public health. So, Solid Waste Management (SWM) is prime concern of the modern world. Directives of the Supreme Court and consequent enactment of Municipal Solid Waste (Management and Handling) Rules, 2000 in Kerala have added urgency to the issue. SWM involves purposeful, scientific and systematic control over the generation, storage, collection, transportation, processing and disposal of various kinds of solid wastes. In India, Kerala State that is often projected as 'God's own Country' for attracting the foreign tourists into the State and hence garnering more foreign exchange earnings (FEEs) needs to take extra care in waste management in general, including SWM, foreign tourists being very keen on cleanliness. The network of Government-sponsored pro-women 'Kudumbashree' needs to be used in SWM.

2. RELEVANCE AND SIGNIFICANCE OF THE STUDY

Rapid population growth, urbanization and industrial growth have led to severe problems of waste management

in Indian cities. These developments will have serious implications with regard to the performance of municipal governments in the provision of municipal services (Singh, 1999). Also increased economic activities and technological developments have led to generation of huge quantity of solid waste in urban areas. (Trehan, 1992). Municipal Corporations and Municipalities generally collect solid wastes by diverse transportation modes like handcarts, animal-driven carts, rickshaws, etc. whereas street-sweeping is often done manually. Disposal of wastes in an unhygienic way as open dumping has become a common practice and such dumping areas have become breeding grounds of pathogenic microbes and their vectors (Jha, 1998). Extensive use of open dumping by urban and local self-government institutions prompted environmentalists to characterize urban India as a site of rotting garbage (The Hindu, 1995). This highlights the need for correct planning and managing of SWM practices. Efficiency improvements in SWM practices help to minimize hazardous environmental impacts. Unscientific SWM by municipalities lead to outbreak of epidemics of plague, cholera, malaria and that will result in high death tolls (Sudhir et. al., 1996). Most municipalities except a few progressive ones, are unable to provide the desirable level of conservancy services as they are afflicted with several problems (Mazumdar, 1996). The case of Kerala is especially vulnerable as improper SWM affects its vital tourism sector.

3. OBJECTIVES THE STUDY AND METHODOLOGY

The objectives of this papers are (i) to appraise in general the growing need for proper SWM in India with special reference to Kerala State and that too with a focus on Ernakulam city, and (ii) to suggest measures for more effective SWM at Ernakulam based on the study findings. The study is descriptive analytical. It uses both primary and secondary data. The study is conducted to assess the SWM practices in Ernakulam. It involves the evaluation of facilities connected with collection, transportation, storage and disposal of solid wastes in different parts of

Ernakulam District. The data relating to collection and transportation of wastes is compiled from the Kochi Corporation and the nearby Municipalities, viz; Kalamassery, Thirupunithura, Aluva, Paravur, Angamaly, Perumbavoor, Kothamangalam and Muvattupuzha. The existing standard of the management systems are analyzed and their efficiency in this study. It relates to the number of heavy vehicles that are covered with nets while carrying the wastes to the disposing areas; the details are assessed by observation for a week at all municipal landfills during morning shifts. It aims at finding the manpower needs for collection, transportation and routing of vehicles for disposal of solid wastes in the city.

4. SOLID WASTE PROBLEMS IN INDIAN CITIES

Research study carried out by the SWM cell of the All India Institute of Local Self Government shows that big cities spend approximately Rs.1000/- to Rs.1,400/- per tonne on SWM in cities. Thus, at the national level Rs.10 to Rs.12 crore are being spent every day on management of municipal solid wastes (Sneha Palnitkar et al, 2004). Except in the metropolitan cities, SWM is the responsibility of a health officer who is assisted by the engineering department for the transportation work. As SWM is a generally labor-intensive activity, 2 to 3 workers are engaged per 1000 residents. The municipal agencies spend 5-25 percent of their budget for SWM, which accounts for Rs. 75 to Rs. 250 per capita per annum (Kumar and Gaikwad, 2004). Despite the huge amounts of public money spent on waste management, SWM in most Indian cities is unsatisfactory, including cities in Kerala.

5. SWM IN ERNAKULAM: FINDING THE OPTIMAL WASTE COLLECTION INFRASTRUCTURE

This study is confined to Ernakulam District in Kerala. SWM is in a pathetic state at Ernakulam. It creates ecological problems, like, flood, water logging, mosquito menace, sanitation and environmental hazards and health related issues. There is steadily growing pressure on the infrastructural facilities and also core sector services in Municipalities and Panchayats. Except in Kochi Corporation, the problem is similar in all municipalities. Although the mean per capita waste generation is about 450 grams per day (gpd) a good portion of household waste is disposed in individual compound itself (Reghunadan, 2004). Methods of vermicomposting and biogas production are practiced in outlying areas where household land extent is comparatively more. The wastes generated in Kochi Corporation are collected for treatment at Brahmapuram treatment plant. In two municipal areas viz., Kalamassery and Paravur door-to-door collection is done from a central area. The operation and maintenance cost in such cases is being recovered from beneficiaries. No systematic SWM practices are carried out to dispose

the solid wastes generated in Municipalities in Ernakulam. An optimum level of infrastructural needs for Kochi Corporation and Municipalities in Ernakulam district is found as per the norms set by Kerala State Pollution Control Board and Ministry of Environment and Forests. In this optimality study, the required demand for sanitary workers is found using the criteria: (a) The total sanitary workers required is found at 2-2.5 workers per 1000 population. (b) The workers capacity to collect individually and with the help of cart cycles of 60-65 kilogram capacity.

The vehicular requirement of different capacity to collect wastes from community to landfill sites are studied based on existing vehicles and required number, the surplus and deficit regions are identified. At present both heavy and light vehicles are used by the Corporation and the Municipalities. The route map of Kalamassery Municipality has been used to compare total distances travelled by waste collection vehicles to cover the existing routes and new routes. The route chart for the waste collection vehicles from communities has been based on the optimum distance and time required to cover the collection points. The inadequacy of sanitary workers complicates the management of waste disposal. The percentage deficit of manpower is 39.39 per cent in Perumbavoor municipality, 77.10 per cent in Angamaly, 55.00 per cent in Aluva, 53.06 per cent in Paravur, 38.17 per cent in Kochi, 71.97 per cent in Kalamassery, 89.93 per cent in Thriuppunithura, 68.49 per cent in Muvattupuzha and 69.56 per cent in Kothamangalam municipality. The number of vehicles and trips available are not sufficient for eliminating the problems connected with waste management. There is absolute requirement for additional number of vehicles for the efficient coverage of the regions which are described in the optimum infrastructure requirement for the city. The transfer stations or collection points are environmentally degrading. This temporary collection points facilitate vehicles to unload solid waste. The waste should be moved from there within 48 hours of arrival to landfill sites. In many cases waste has not been cleared for days. The collection points create unhealthy environment for people residing nearby. The wastes from collection point are removed by vehicles and transported to landfills. Ernakulam has inadequate number of vehicles. There is a need for changing vehicle pick up schedule so as to have a complete waste collection system.

The optimum waste collection infrastructure aims at establishing the required level of services for collection and transportation of solid waste in the city. The structure proposed requires a total manpower of 2243 for solid waste clearance while there is only 1165 manpower at present. This shows a deficit of 48.06 per cent in manpower. This basic study shows that clearance efficiency among sanitary workers can be improved by using cycle carts for collecting waste through door to door operation. The carts have carrying capacity of wastes of 60 kg/shift. The usage of carts enhances the pickup efficiency up to 67.05 tonnes per day by two sanitary

workers per trip. The vehicular requirement study reveals some deficit in vehicles. For efficient collection Perumbavoor needs 3 vehicles with 4tonnes -5 tonnes capacity. The requirement of vehicles with similar capacity in other areas are Angamaly 3, Aluva 4, Paravur 3, Cochin 64, Kalamassery 6, Thriuppunithura 6, Muvattupuzha 3 and Kothamangalam 4. The deficiency in the number of vehicles can be made up to some extent by rescheduling the trips. The path optimization exercise reveals that in efficiency collection of wastes can be increased by covering maximum collection points and reducing travel time by using the shortest path. Comparing the total distance travelled by vehicles through the existing routes and the proposed new routes shows that the total distance travelled by vehicles through new routes will be covered in 13.663 km. This will reduce clearing time by 3 hours. Similar studies can be extended to other municipalities to enhance the efficiency in waste collection and disposal.

6. A SCIENTIFIC AND SUSTAINABLE APPROACH TO SWM IN ERNAKULAM

In Kerala, the State Poverty Eradication Mission (SPEM) was inaugurated on 17th May 1998 by the then Prime Minister of India in Malappuram district of Kerala. SPEM, popularly called ‘Kudumbashree’, formally started its operations on 01st April 1999 and is very active in almost all facets of Kerala society. It has been particularly active in women empowerment, as it ensures livelihood options for its lakhs of women members. SWM is one of the activities of Kudumbashree women, whereby they regularly collect household wastes, segregate them into different types (biodegradable and non-biodegradable), transport them to dumping sites, and enable its processing. Considering the gravity of the waste management issue, particularly SWM, and its adverse impact on the Kerala economy particularly in sectors like tourism, the participation of Kudumbashree in SWM needs to be further strengthened.

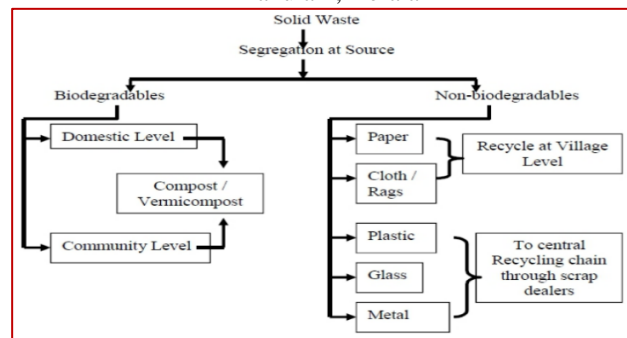
Bringing SWM and allied works under the MGNREGA scheme is also worthwhile. Tamil Nadu State has initiated SWM through MGNREGA. (Josephine, 2015). In the context of worsening SWM situation in Kerala, particularly in industrial cities like Ernakulam, effective measures need to be implemented for SWM. Ensuring more active participation by the Kudumbashree women is very meaningful. Equally good is the case of including SWM under the MGNREGA, seeking the help of migrant workers for SWM (especially in removing construction related debris as majority of the construction workers are migrants from other States. Migrants constitute majority of the workers in the construction sector in Kerala, especially in Ernakulam – the hub of construction activities in Kerala. (Vidya Viswanath, 2015). Hence, using their services in SWM, particularly in the disposal of construction wastes is worthwhile. While using the services of migrant workers in SWM, the

relevant regulations regarding the engagement of their services need to be adopted.

Technologies that protect the Kudumbashree women engaged SWM activities need to be adopted as they are prone in many health issues while engaging in ‘Dirty jobs’ like SWM that involves collection, segregation and composting of waste (Dhanalakshmi, 2014)(a). Also, in high density housing regions like Ernakulam practices like Household Waste Management (HWM) which involves waste treatment at source which is an environment-friendly as well as scientific method for SWM that needs to be practiced today (Dhanalakshmi, 2014)(b). The Household Waste Treatment (HWT) technologies need to be adopted for waste reduction at source in the modern world. (Dhanalakshmi, 2015)(a). Yet another major development regarding the technological advances in SWM is that of WTP (Willingness to Pay) approach towards aerobic treatment of wastes and this approach has been successfully applied in Alappuzha in Kerala and can be replicated elsewhere (Dhanalakshmi, 2015)(b). Another imperative today is that of integrating Information and Communication Technology (ICT) into all waste management initiatives, like SWM. Use of ICT-enabled gadgets like Smart phones needs to be promoted among the waste workers, like, Kudumbashree women.

All the stakeholders engaged in the SWM process, including the vehicle operators be duly integrated through ICT, and all communications should also be done through ICT. ICT can minimize the process time, enhance quality and reduce cost. In view of the above discussions, it seems that the ideal model that can be replicated in the Kerala context also is the one proposed by Shrikant M.Navrekar (2008) (Figure I). Only thing, the services of Kudumbashree, linkage with MGNREGA and ICT adoption etc. should be incorporated, and scientifically computed vehicular infrastructure needs to be ensured too.

Figure I: Model for SWM that can be adopted in Ernakulam, Kerala



Source: Shrikant M.Navrekar (2008), “Sustainable Solid waste Management: Need of the hour”, Nirmal Gram Nirman Kendra, Govardhan (Gangapur) Nashik.

7. BENEFITS OF SCIENTIFIC SWM IN ERNAKULAM: IMPACT ON OTHER SECTORS

It may be pointed out here that effective SWM in Ernakulam (Kochi) has got implications on other sectors. For instance, rural tourism in the vicinity of Ernakulam city, viz. Kumbalangi - the first model rural tourism village in the whole of India, is vitally influenced by the clean ambience and apt infrastructure in the city. Manoj, P. K. (e), (Manoj, P. K., 2016) (a) & (b); and foreign tourists are repelled by the unclean surroundings. Similar is the case of Fort Kochi beach and heritage sites at Kochi where littering of plastics and other garbage cause discomfort among the tourists. For further boosting the tourism models like Responsible Tourism (RT) and Ecotourism in a sustainable manner, which are already being heavily marketed by the Govt. of Kerala (GOK), preservation of the environmental purity is vital. (Manoj, P. K., 2015)(a) to (d). Besides tourism, in respect of the Housing and Real Estate sector too, particularly the segment comprising of apartments, flats etc. including office spaces can flourish in Ernakulam. This is because, in the current regulatory regime, SEBI fosters REITs and other innovative investment models in real estate (Manoj, 2016)(c). Here, it may be noted that proper garbage disposal and cleanliness is one of the most important priorities for the sustained growth of Housing and Real Estate sector, just like tourism sector. Moreover, tourism sector as well as Housing and Real Estate sector, both have vast linkages with lot many other sectors of the economy and are highly employment-generative too. The sustained growth of these sectors need scientific waste management system, including SWM.

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CONCLUSION

There is a growing need for solving the waste management problem in Kerala, especially SWM, because it affects the whole Kerala economy which depends on vital sectors like tourism. Modern technologies and scientific methods for SWM is an imperative rather than an option in Kerala. As a continuation of the present study, specific and focused studies on the role ICT in waste management, waste management in the tourism sector etc., and problems associated with women engaged in SWM etc. need to be studied in more detail.

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