

Implementation of Integrated Solid Waste Management through Public Private Partnership in Dehradun Town

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ABSTRACT

Dehradun is the capital of Uttarakhand province of India, created in 2000 after carving it out of Uttar Pradesh province. Since then, Dehradun has been the hub of all the major developmental activities. Due to population influx from its neighbouring hilly districts and huge growth of the industries, there was high pressure on its civic authorities and the municipal bodies to dispose the waste generated by the households and the commercial units.

Domestic waste is for the most part discarded by the residents on the roads, drains, open ground, fallow land, and so on, sometimes burnt in open, which creates unhygienic environment for their well-being. There is no existing methodology available or practiced by the municipality for scientific and integrated solid waste management. Thus, there is a strong and urgent need to introduce required changes in solid waste management by Dehradun municipality in order to make the town hygienic and beautiful. This paper suggests an integrated management approach by using Public Private Partnership (PPP) for Dehradun.

Keywords: *Solid Waste Management, Municipal Corporation, Public Private Partnership, Recycling*

OUTLINE OF THE PROBLEM

Dehradun has seen huge rise of urban population in the recent years and consequently rise in the urban waste also. The population of Dehradun was 1.69 million in 2011 (Census 2011), whereas it was 1.28 million in 2001 (Census 2001), therefore there has been around 32 per cent increase in its population since it became capital of Uttarakhand province. The growth of industries in Dehradun has also been

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phenomenal during this period (DIC Dehradun, 2012), from 247 units in 2001 to 3044 till 2011-12. The municipal waste generated by urban areas is 291.8 million tonne per day (Urban Development Report, 2015). The waste generated is disposed by citizens either on the roads or fallow lands or by municipality (Urban Development Report, 2015) by doing collections to some extent and then throwing at a dumping ground at Sahastradhara, which activates methane emission due to anaerobic decomposition of waste (UNFCCC, 2012) and also contains perilous, chemical and factory wastes (Fig. 1).

Fig. 1: Dumping ground at Sahastradhara, Dehradun



Source: *Hindustan Times*, 11 Nov. and 26 Dec. 2017.

This procedure of unscientific waste disposal and methane emissions cause a number of health issues (Pandey Vidush, 2017) not only for the residents of Dehradun but also for its neighbouring areas. Also, the recent burning of the waste caused breathing problems for the students of the school nearby (*Pune Mirror*, 11 Nov. 2017). Another severe repercussion of this is that the water of Bindal river (a small rivulet flowing through the town) has become black in colour having all sorts of toxic elements in it (Pandey Vidush, 2017).

There is also an absence of segregation of waste at source by the residents. The financial position of the Municipal Corporation is also not very sound and workers are not being paid their salaries in time leading to strikes which are resolved by intervention of the Ministry of Urban Development (*Amar Ujala*, 28 Apr 2017)

In order to have a solution to these problems, this paper outlines suggestions to develop a new policy on Integrated Solid Waste Management (SWM) of Dehradun urban area through Public Private Partnership (PPP).

Possible Opportunities for Change

Various rules and provisions such as Municipal Solid Waste (Management and Handling) Rules 2000, Jawaharlal Nehru National

Urban Renewal Mission (JnNURM) 2005, a flagship scheme of Government of India and Swachh Bharat Mission (Clean India Mission) (SBM, 2014) aims at clean India Programme. Availability of efficient private sector in the market to handle such types of work and various successful examples in the country (Nagpur, Chennai, Pune) shows that Public Private Partnership (PPP) could be an effective tool to dispose solid waste (GoI-ADB-PPP initiative, 2010). Many municipalities are facing financial problems and are not in a position to set up an integrated SWM on their own and therefore introduction of PPP can be an effective way of solving this problem.

National Green Tribunal (NGT, 2015), Central Pollution Control Board and Hon'ble Supreme Court of India has also passed directions to the Government of Uttarakhand to come out with the solution to this problem in a time bound manner.

The Current Scenario

Under the Government of India flagship scheme of JnNURM 2005, the municipal corporation of Dehradun started the waste management by involving the private enterprises for door-to-door unsegregated waste collection and dumping it at the earmarked landfill site at Sahastrdhara (Urban Development Ministry Report, 2015) without any processing. The waste is simply dumped at one place, leaving it to rot and emit greenhouse gases much to the discomfort of the public. The private operator roped in through outsourcing by the Municipality also faced operational problems due to pressure groups' interference with regard to dumping problems. Public have started protesting against this dumping of waste and overflowing of dustbins (Fig. 2). Common dustbins are not cleaned regularly and are left overflowing with waste, waiting to trigger health hazards.

The problem of dumping the waste at Sahastradhara site has become a highly volatile matter with the public up in arms (*Pioneer*,

Fig. 2: Overloaded Dustbins in Dehradun Town



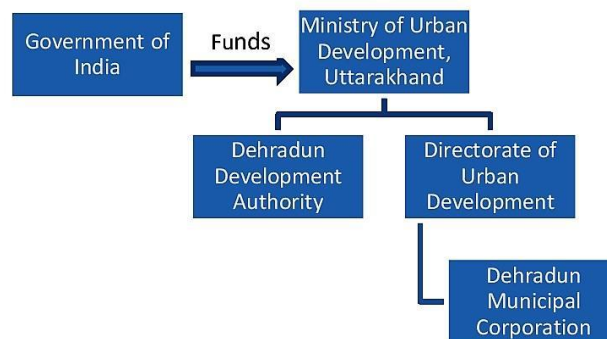
Source: *Times of India*, 12 Nov., 2016.

16 July, 2016) against the municipal authorities due to problem getting aggravated day-by-day. Therefore, the current situation confirms the inadequate mechanism in place for solid waste management and the city requires an integrated approach in order to have the long lasting solution instead of a cosmetic one.

Role of the Government

Ministry of Urban Development, Government of Uttarakhand and the Municipal Corporation Dehradun are the responsible agencies to undertake the effective solid waste management. Government of India has provided funds to municipal bodies to improve quality of life and infrastructure of cities, with solid waste management being an integral part of it. The urban development ministry has a defined organisational structure in order to perform waste management task (Fig. 3).

Fig. 3: Waste Management Administrative Setup (Urban Development)



Source: Ministry of Urban Development, Government of Uttarakhand 2017

The mandate of these departments is to have a balanced town planning along with provisioning of basic urban infrastructure to the residents (CDP, 2007). The Ministry is required to enact the policy and do necessary resource allocation for the effective implementation by the Municipal Corporations. Another ambitious project of Government of India, i.e Swachh Bharat Mission also mandates every municipality to work towards effective and scientific solid waste management (SBM Guidelines, 2017).

Existing Data

A draft action plan (MoUD, 2015) on Solid Waste Management was prepared by department of urban development to suggest improvement in solid waste management. One study (Kalyani KA, Pandey K K, 2014)

came out with strong recommendation on utilisation of option of waste to energy conversion. Confederation of Indian Industry conducted a study on four Indian cities and came out with recommendations on using incinerators (CII, 2017). Another study worked on problems of Dehradun waste management and emphasised on increasing awareness amongst the public (Pandey Vidush, 2017). One more study worked on Futuristic Projection of Solid Waste Generation in Dehradun City of Uttarakhand using Supervised Artificial Neural Network-Non-Linear Autoregressive Neural Network (Saini, Ahuja, Bahukhandi, 2017). A DPR was prepared for Urban Development Directorate by a consultant suggesting financial plan, implementation methods and sustainability of waste management of Dehradun (IPE Global, 2008). Another study came (Ahuja J N, 2013) out with a suggestion on a user-friendly expert system on solid waste management of Dehradun.

Most of the studies emphasised on scientific disposal of the municipal waste by recycling and conversion of waste into energy. These have been practiced at many places especially in South Korea (Ryu C, 2010). However this requires huge initial capital cost (CAPEX) and maintenance cost (OPEX) and the financial conditions of municipal corporation do not allow to take this step (DMC, 2016). Moreover, this problem is sometimes further aggravated by the human resource management issues hence an integrated approach either by financing from the government or by using PPP mode is needed.

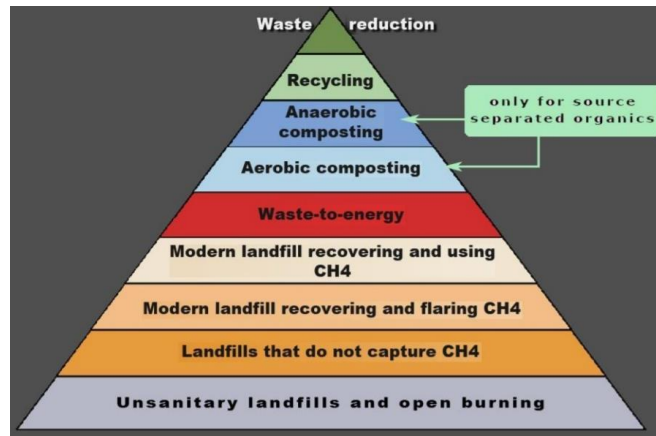
Strategy for designing and implementation of integrated approach towards Solid Waste Management

The causal theories are very important with respect to formulation of a public policy and the difficulties remain buried until or unless we get agitated about it (Stone D A, 1989). We also understand how evidence and knowledge are fused to have a policy translation. (Ingold and Monaghan, 2016). Studies have suggested various sustainable options for solid waste management which can be best described by the desirability pyramid showing various methodologies of waste disposal (Fig. 4).

Keeping in mind sustainable, scientific and effective waste management, a strategy is proposed on the lines of Build, Operate and Transfer (BOT) for Integrated Solid Waste Management of Dehradun under Public Private Partnership mode with following components:

- a) Door-to-door collection of municipal waste from the residential and non-residential areas of the town, its transportation to the dumping/processing site.

Fig. 4: Hierarchy of Sustainable Waste Management



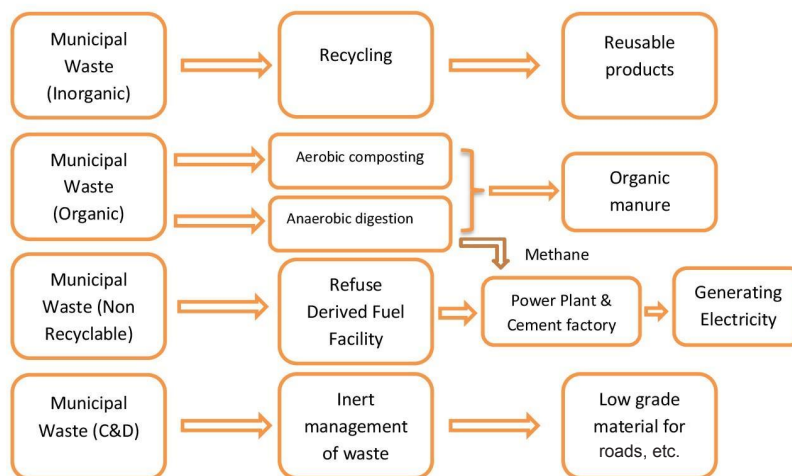
Source: Annepu R. K., 2012, WTER, Columbia University.

- b) Directions to all the construction agencies to dump their construction and demolition waste at the processing site earmarked above.
- c) Installation of Binless collection of waste at common locations. This is a unique technique to be used to get rid of overflowing dustbins. This is more hygienic, good aesthetics and easy to handle also.
- d) Installation of waste processing plant with following facilities;
 - i) Recycling
 - ii) Aerobic Composting
 - iii) Anaerobic Digestion
 - iv) Refuse Derived Fuel
 - v) Waste to Energy Combustion
- e) A recycling Plant is to be installed for recycling plastic, paper, glasses, etc.
- f) A plant for the aerobic composting of the organic waste to compost is to be installed. This kind of composting avoids emission of green house gases.
- g) Treatment of organic waste by anaerobic digestion to convert it into energy in the form of bio gas (Biomethanation). This can be used as a fuel or if used in generator can produce electricity.
- h) A plant to convert the municipal waste into Refuse Derived Fuel (RDF). RDF can be used as a substitute for coal for industrial combustion requirements.

- i) A plant for converting waste to energy by the process of controlled combustion by thermally breaking down combustible solid waste to an ash residue and in the process producing electricity. South Korea is using this technology very effectively by generating electricity equivalent to 1.66 million tonne of oil equivalent (TOE) (Jeong and Jihyun, 2017).
- j) Conversion of construction and demolition waste into building material of low standard to be used for road construction, can be done by using inert waste management technology.
- k) Department of Urban Development, Government of Uttarakhand has to ensure the fulfilment of all the prerequisites for the smooth implementation of the project, whether it is land availability, environmental clearance or any other legal matter in this regard. The whole process has been depicted in the form of flow chart (Fig. 5).

Dehradun Municipal Corporation is required to prepare a Request for Proposal (RFP) to invite bids from interested parties to perform the above scope of work under Public Private Partnership. Since this integrated system would require an initial capital infrastructure, Government of Uttarakhand, Department of Urban Development can have this PPP by providing financial support to the concessionaire in the form of Viability Gap Funding (PPP Cell, 2005). During operation the concessionaire would recover its cost by levying user charges on the residents and other agencies from where the waste is collected. Also, the concessionaire would be selling the compost, recycled

Fig. 5: Proposed Waste Management Plan



materials, RDF and the electricity generated and earns revenues (carrots for it) out of it. The PPP would be having a span of at least 15 years in order to have the effectiveness and financial viability for the concessionaire.

Evaluation of the Proposed Strategy

Monitoring and evaluation of a public policy is highly important to judge effectiveness, efficiency, service orientation, accountability, democratic process and the trust of the people (Davies Phillip, 2008). Whatever strength a policy or strategy has, the assessment of the magnitude of the policy instruments has major challenges in the form of various interferences it faces (Naoko Tojo, 2008).

The project would be evaluated on the following phased pattern in order to judge its impact and need for any intervention. It is proposed that both qualitative and quantitative method of data collection (Silverman, 2004) would be employed.

- 1) During first year, the performance of the concessionaire would be monitored on regular door-to-door collection of waste. For this a survey would be conducted from a sample of residents. Data comparison would be done about the solid waste generated by the households and other entities during the previous year.
- 2) During the second year an audit of the performance of this action plan would be conducted to assess its progress and financial position. The water of the streams inside the city, e.g Bidal and Rispana would be tested to judge the effect of the project. The condition of the underground dustbins would be monitored.
- 3) During the third year, need for revision in tipping fee may be explored as per concession agreement. It is to be judged by the Municipal Corporation Dehradun whether this policy of having integrated system has been an effective way of SWM or a fragmented one would have been better. The quantity of the bi-products produced and its sale by the concessionaire would be an indicator of its profitability.
- 4) All this assessment would be repeated in a phased manner to judge the sustainability of the project and to preserve the nature (Sofía García-Cortés, Ellen Gunsilius, Barbara Ölz (2014).

CONCLUSION

The Government authorities and the public should work sincerely to advance source level separation of waste, accomplish higher rates of recycling and deliver usable manure from organics. While this is being accomplished and reusing is expanded, arrangements ought to be made to deal with the non-recyclable waste. State governments should play a proactive role in streamlining the implementation of these endeavours. Enhancing SWM in India is very important. Recycled materials and electricity recuperation from waste is a critical part of enhancing SWM in India. Having an integrated and effective approach would serve a long lasting purpose.

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