

Sustainable solid waste management in Balangoda Urban Council, Sri Lanka

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Abstract

The Municipal Solid Waste Management (MSWM) system of local authorities in Sri Lanka contributes to exchange some productive outputs with localities; however it is still not in a better successful mode due to limitations and environmental failures in their operation. This study by conducting a status quo analysis; a strengths, weaknesses, opportunities and threats (SWOTs) analysis; and an effectiveness analysis, aimed at helping understanding the sustainability of MSWM taking Balangoda Urban Council as a case. The research was performed based on analyzing information obtained from field observations; reports; literature; questionnaire distribution among community; and a series of focus interviews with major stakeholders concerned. After accomplishing the effectiveness analysis with outcomes of other two analyses, it could be concluded that the current performance of MSWM procedure in Balangoda Urban Council is partially sustainable.

Key Words: Municipal Solid Waste, Municipal Solid Waste Management, status quo analysis, SWOT analysis, effectiveness analysis

Background

Municipal Solid Waste Management (MSWM) has become a critical environmental concern due to rapid urbanization and economic development in many developing countries (Dasgupta, 2013). Similarly, Sri Lanka as a developing country is also facing such situations in urban waste management. The local authorities are responsible for MSWM in Sri Lanka and practice several methods of disposal as open dumping, composting, land filling, incineration, direct and indirect recycling. However due to some limitations such as high operational and management cost, poor quality products and poor understanding of the process, economically viable, environmental friendly and socially acceptable methods are limited in use. Therefore it appears that the most of the waste disposal practices can harmfully affect the environment, such as open dumping on land and water bodies, direct combustion and so forth (Simon, 2008). These poor methods lead to several environmental crises, for instances; contamination of surface and groundwater, soil and air pollution (Sawyer et al., 2003). Household waste contains considerable amount of organic or naturally degradable materials, however managing urban waste by respective authorities is still not in a fully successful mode in Sri Lanka.

Research Problem

The planned waste management authorities of Sri Lanka face some problems due to inadequacies in their MSWM procedure. Despite the fact that a designed waste management system has already been implemented by these local authorities using various programmes, the sustainability of such methods and technologies is still questionable. Many of the formal interventions over the past several years have also failed to meet expected benefits.

Objectives

The main objective of the present study is to investigate the sustainability of present Municipal Solid Waste Management practices in Sri Lanka taking Balangoda Urban Council as a case study. More specifically the study is targeted at three main objectives as:

- to examine the ongoing waste management procedure in the Urban Council,
- to analyze strengths, weaknesses, opportunities and threats (SWOTs) in the processes,
- to evaluate the effectiveness of Municipal Solid Waste Management activities

Research Methodology

The research methodology used consisted mainly three parts (Yuan, 2013). In the first part, the latest status quo of MSWM in Balangoda Urban Council was introduced in detail by referring to information collected from field observations, government reports, MSWM related literature, interviews with community within the division and consultations of the government department staff that are responsible for the municipal waste planning and management. Furthermore, a group of research questions were formulated aiming at diagnosing the strengths, weaknesses, opportunities and threats of MSWM in Balangoda Urban Council. In the second part, a detailed SWOT analysis was performed based on the research questions developed. Answers to those questions were abstracted through analyzing information obtained from questionnaire distribution among 100 citizens of the area and a series of focus interviews with major stakeholders concerned, which included Central Environmental Authority staff, Balangoda Urban Council members and relevant university resource persons. Five focus interviews were carried out and each lasted 40-50 minutes. Moreover, 5 labourers at the solid waste management centre were also interviewed. Finally, an effectiveness analysis for waste management activities was performed with 6 experts such as university resource persons and Central Environmental Authority members. For that, questionnaire distribution was also used to detect the community acceptance and involvement of the process. In here, a certain percentage for each activity was given by considering the environmental, social, economical and technical contexts of MSWM processes for addressing the sustainability of ongoing system. The study was conducted within a period of six months.

Key Findings

Results of the Status Quo Analysis

The present waste generation on daily basis in Balangoda town is 20 tonnes and main sources of MSW are households, commercial establishments such as markets and restaurants, municipal services as well as institutions. Generated waste generally constitutes 70% of organic waste; 20% of recyclable and other useful materials; and 10% of discarding materials (BUC Report, 2013).

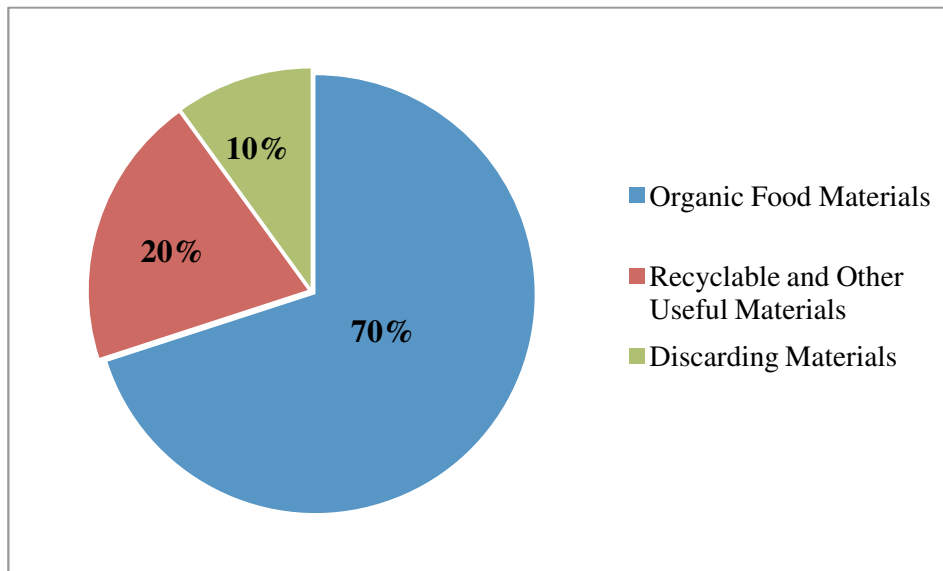


Figure 1: Composition of MSW in Balangoda Urban Council Area (Source: BUC Report, 2013)

The stakeholder consultation results showed that the overall waste management procedure of Balangoda Urban Council encompasses six divisions as waste minimization and prevention, waste collection, on-site separation and handling, waste transportation, further management and final disposal. Further management also consists of grading, composting, recycling, producing sludge fertilizer, training and education which were observed in the field survey. As a result of community consultation, it could be identified that the waste minimization and prevention includes awareness building within the community, waste taxation, helping for home composting and maintaining school and rural level 3R societies. Waste collection of the Urban Council is systematic and performs two shift-works per day. Furthermore, bell collection system, curbside collection, door to door collection, special place collection and hand cart collection is also carried out for proper waste collection (BUC Report, 2013). According to the field observations, on-site separation and handling conducts to divide food waste, polythene, electronic waste materials and regiform products at each site. Collected waste transports to the solid waste management centre and in here, further management complies. Under grading, 11 items are separated to value as market products (BUC Report, 2013). Furthermore, total food waste is subjected to the composting process whereas separated plastic parts of e-waste and

polythene is undergone in recycling process. Moreover, collected human sludge is utilized to manufacture a night soil fertilizer as well as training and education on waste management is also offered for necessary people at this solid waste management centre. Finally, unused materials in the operation are discarded to a small open dump site.

Results of the SWOT Analysis

The established location of the solid waste management centre, regular waste collection, establishment of waste buying centers and recycling centers, conducting strong awareness and training programmes on promoting MSW management and waste taxation could be found by ways of strengths while identifying weaknesses as operational deficiencies of open dump site, inefficient food waste sorting, short comings in compost manufacturing process, apathy to manage lunch sheets and failures in sludge fertilizer production. Furthermore, installation of biogas unit within MSW management centre, introducing five bins for waste segregation and obtaining external supports from government and industrial associations recognized as opportunities. Moreover, insufficient concentrations to promote research on environmental safeguard, nullity of compost standardization and leachate toxification observed under threats.

Results of the Effectiveness Analysis

The suggested mean percentages by expert groups to estimate the sustainability of each activity in Balangoda Urban Council were 95% for waste collection as well as training and education, 80% for waste minimization and prevention, 75% for waste transportation and recycling, 70% for composting, 60% for grading and on-site separation with handling, 50% for producing sludge fertilizer and 30% for final disposal respectively. When considering the community feedback on waste management practices, over 65% citizens have strongly accepted the ongoing operation of activities such as waste minimization and prevention, waste collection, on-site separation with handling and waste transportation while few amounts of people accepting those moderate or weak performances. In the case of solid waste management centre, 47% and 35% of people have expressed that activities of grading and sludge fertilizer production are excellent or good respectively. Furthermore, over 50% of residents have marked that composting; recycling; training and education are acceptable practices while strongly rejecting the method of final disposal. It is important to note that the most of citizens are not aware of conducting activities at the solid waste management centre.

Conclusions

At present, Balanagoda Urban Council is considered as one of the well-planned waste management authorities in Sri Lanka. But it doesn't have a better sustainable mode yet. In the ongoing system, it should be addressed limitations properly to meet the sustainability of practices as well as it is important to further improve strengths to enhance effectiveness of the operation. According to the

expert opinions, if waste minimization and prevention, waste collection, transportation, recycling, training and education are identified as sustainable practices, they also have some drawbacks; therefore these couldn't be categorized as fully sustainable. Furthermore, on-site separation and handling, grading, composting and sludge fertilizer production are classified as partially sustainable practices while the final disposal to an open dump site is sorted out as an unsustainable practice. The most important thing that except the method of final disposal, other practices are accepted as sustainable or even partially sustainable operations by majority of the community within Balangoda division however they have some shortcomings too. Moreover, the worst feedback observed from the residents is lack of knowledge on waste management activities at the solid waste management centre. Consequently, overall MSWM system of Balanagoda Urban Council is concluded as partially sustainable operation.

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