



## Exploring full cost accounting approach to evaluate cost of MSW services in India



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### ABSTRACT

Municipal solid waste (MSW) services of developing countries often suffer due to the lack of financial and operational autonomy, scientific approach, and adequate levels of resources. The solid waste management (SWM) practices of developed countries are benefited in cost and efficiency due to the participation of private players and sound financial management. However, developing economies depend on local municipalities to own and operate SWM services amidst structural and financial inefficiency. With the demands of augmenting efficient and cost-effective SWM services to the expanding population of cities and towns of newly industrialized nations on the rise, the municipalities in these countries are under pressure to adopt ways and means that can support efficient utilization of resources and improved decision-making capabilities. This research article reflects the current state of the MSW services in India and explores full cost accounting (FCA) framework in its ability to generate information on cost-related aspects and sustainable deployment of resources. Lastly, the extensibility of FCA is tested by integrating externalities of MSW services.

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### 1. Introduction

Efficient and effective municipal solid waste management (MSWM) is a contentious and political issue of newly industrialized economies. In India, the solid waste management (SWM) of a town or city is the sole responsibility of the concerned local municipal body, which is a complex set-up of multiple stakeholders with limited financial and administrative autonomy. These stakeholders can be grouped into public sector (national, state, and local authorities to fund the SWM activities), private sector (large and small enterprises which carry out different municipal activities), informal sector entities (rag-pickers, itinerant buyers, traders, and small-scale recyclers), and local communities and its agencies (including NGOs and voluntary bodies). With the 74th constitutional amendment, the purview of local municipalities in India is extended to include urban local bodies (ULBs). The expanded responsibilities of the ULBs include formulation and implementation of urban administration policies to cover the areas of social development, public health and sanitation, slum development, etc. However, the governance of ULBs is not uniform and depends on the current status of adoption of the said amendment by the municipalities of a region (Mahadevia and Wolfe, 2008).

In addition to the aforesaid complexities, the municipalities in India depend on state and central agencies for financing its SWM and other activities. Until recently, municipal bodies have been following cash basis of accounting to record financial transactions without even differentiating capital from revenue expenditures (ICAI, 2009; NIUA, 2010). The lack of transparency in accounting functions of the municipalities and unavailability of performance reports in the public domain lead to the difficulty of estimating cost of MSW services. Also, there is little evidence of research around financial efficiency and performance of SWM services within Indian context. The ones that chose to explore this and other allied areas could offer limited generalization in SWM costs, mainly due to the uneven behavior of costs that change with demographics and cannot be sourced from verifiable data sources (Parthan et al., 2012b).

However, in the era of rapid industrialization need for efficiency in public services, rapid rate of subcontracting, and effectiveness of private sector would make it imperative for the policy makers and local administrators to understand the cost related implications of chosen strategies. Full cost accounting (FCA) is one of the decision-making frameworks recommended for SWM services in literature (EPA, 1997). Although the inclusion of external costs within FCA has been experimented in corporate organization to some extent (Antheaume, 2004), it has rarely been explored for integrating externalities within the context of MSWM, especially that of newly industrialized nations. With the help of financial data from the annual accounts of Municipal Corporation of Greater Mumbai (MCGM), this research article experiments with the applicability of

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FCA framework to evaluate cost of the MSW services and expands it by integrating externalities, so as to explore the capabilities in supporting improved decision-making. To achieve this objective, the rest of the paper is organized as follows: Section 2 covers literature review followed by the development of cost objects and cover SWM activities in Section 3. Section 4 retro-fits FCA framework with data collected from secondary sources and subsequently improvises it with the cost of externalities. Section 5 discusses the results of FCA framework to tests its applicability in improved decision-making. Section 6 summarizes the findings from this exploratory study and offers suggestions for future research.

## 2. Literature review

Review of literature on the SWM practices can cover multiple disciplines of research and scholarship. The focus of the literature review in this article is to explore contemporary economic outlook and notable accounting practices of the municipalities in different countries.

### 2.1. Comparative analysis of SWM between developed and newly industrialized nations

This sub-section covers the literature on the SWM practices of developed nations and different set of tools that are in use to measure and reflect upon the collective efficiency of MSW services. Well-aligned SWM policies of municipal services in developed countries are generally tied to the objectives of generating adequate finance for its activities, which is achieved through the service fees levied on the consumers (Tojo, 2008). The role of private parties has been found to be of significant importance for privatization and successful transformation of the SWM services into a cost-effective and efficient one (Davies, 2007). Literature also indicates the advancements in different SWM functions like methods to improve waste-to-energy (WTE) and other disposal options of MSW (Cuadros et al., 2011), application of contingent valuation models to handle greenhouse gases (GHG) (Parra et al., 2008), use of different economic valuation methods to review and analyze the valuation of externalities of SWM strategies (Eshet et al., 2006), economic impact of closed landfills on property values (Ham et al., 2013), and environmental awareness of the municipalities by experimenting with the adoption of environmental accounting and developing suitable environmental index (Qian and Burritt, 2007).

These and other articles indicate that the success of MSW policies depends on the established legal framework, careful economic considerations to finance SWM activities, adoption of scientific waste disposal practices, and partnership with the private sector. These measures are critical to lower the cost of MSW services, improve resource utilization, and develop efficient recycle chains (Davies, 2007; Tojo, 2008). In comparison, the MSW services in developing countries are owned and operated by the town or city municipalities, but dependent on the central or state agencies for financing its activities (Gechlik, 2009). Although the SWM practices are not uniform and often incomparable across developing countries (Uiterkampa et al., 2011), literature from developing countries like Bangladesh (Sembiring and Nitivattananon, 2010), Greece (Karagiannidis et al., 2008), India (covered in Section 2.3), Malaysia (Aroz and Masud, 2011), South Africa (Friedrich and Trios, 2013), and Taiwan (Chen, 2010) evidence the commonality of conventional approach in handling MSW, limited private partnership, and growing (dis)economies of social externalities. Social externalities of backyard recycling, e.g., waste of electrical and electronics items (WEE) (Manomaivibool, 2009; Sepúlveda et al., 2010), and policy indifference toward informal sector, are supported in literature (Agarwal et al., 2005; Sembiring and Nitivattananon, 2010).

### 2.2. Full cost accounting (FCA)

The prevailing accounting practices limit the transactional processes within the boundary of economic operations and follow the generally accepted accounting policies (GAAP) to record these transactions. This leaves difficult-to-measure costs, including social and environmental contingencies of economic activities, outside the accounting frameworks (Gray and Babbington, 2001). While monetization of these external costs is one end of the problem, building objective interpretations for supporting decision-making, is another. FCA is proposed in literature as an accounting technique that is capable of incorporating complete range of costs, beyond what is recognized in books by following GAAP (IFAC, 2005). However, the external costs are not always easily determinable, may vary according to the scope of investigation, and open to the interpretive bias of economic agents (Herbohn, 2005). In spite of some successful attempts by companies like Ontario Power Generation, BSO/Origin, PowerGen, etc., setting the frameworks to capture external costs have proved to be time-consuming, tedious, inconsistent, and fraught with methodological challenges (Antheaume, 2004). Even though FCA can be considered as an ideological shift toward “inclusive accounting”, it is yet to develop into a practical accounting tool for industries (Bebbington et al., 2001).

On the other hand, adoption of FCA as a part of municipal accounting process and its ability to cover costs that could be associated to the complexities of multi-entity engagements – a common feature of MSWM – is well supported in literature (Antheaume, 2004; Lim, 2011). Traditional FCA restricts it to economic costs alone (EPA, 1997) but it could be expanded to include environmental and social costs (externalities) and bring these within the corporate decision-making arena, as experimented in case of corporate firms (Cuadros et al., 2011). Theoretically, decision making in MSWM would be benefited from the expanded coverage of costs that include the ones being incurred (at present) and/or would be incurred (in future) by society to counter the negative aspects of the discards generated by industrial products and processes (Bebbington et al., 2007; Dascalu et al., 2008). The use of traditional FCA to handle MSW activities in developed countries like US and Canada is available in literature, but the newly industrialized nations are yet to work toward adopting or implementing it (Lim, 2011), and this is an effort to support this direction.

### 2.3. Review of the economics of Indian MSW services

MSWM in India is covered under the legal provisions of the Municipal Solid Wastes (Management and Handling) Rules, 2000, which bestows the administrative responsibility of managing SWM of a region to the concerned municipalities. Also, MSW in India does not cover hazardous, bio-medical, and nuclear wastes, as these categories of waste are covered under separate legal statutes (Mahadevia and Wolfe, 2008) and are outside the focus of this article. To understand the state of MSW practices in India, the authors have reviewed 29 peer-reviewed context-specific articles (Appendix 1). These articles cover bulk of contemporary work that helped us to profile Indian MSW services. This includes region specific studies covering towns and cities like Aligarh (Khan and Ansari, 2010), Delhi (Chakrabortya et al., 2011; Uiterkampa et al., 2011), Kanpur (Zia and Devadas, 2008), Kolkata (Hazra and Goel, 2009), and southern states (Narayana, 2009; Pattnaik and Reddy, 2010).

These articles characterize MSW services in India as fragmented and labor intensive with poorly prioritized goals, operating with limited participation of private sector, and delivering (mostly) free-of-cost services to the citizens (Kumar et al., 2009; Nunan, 2000; Sharholly et al., 2008). In addition, lack of scientific approach in waste handling, recycling, and treatment facilities is evident (Agarwal et al., 2005; Saini et al., 2012). However MSW services

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