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Exploring linkages between sustainable consumption and prevailing green practices in reuse and recycling of household waste: Case of Bhopal city in India

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ABSTRACT

Promotion of reuse and recycling practices at the household level can have a considerable influence in reducing generation of waste as well. This study has examined the existing waste generation patterns, and has identified the green practices adopted at the household level. This study documents and analyzes the possible practices that help in reducing the generation of waste. Waste practices associated with generation, reuse, and recycle, have been documented and investigated for nine material categories of waste such as: paper, plastic, glass, metal, textile, kitchen waste, garden waste, e-waste, and appliances. Field realities from Bhopal, a city in the central part of India having a population of less than two million people, have been captured through detailed stakeholder surveys and focused group discussions with experts. The primary survey was conducted to cover four income groups' categories spanning across 'formal' and 'informal' housing typologies, to understand and examine the linkages between waste generation and life style. Reuse/recycle practices adopted by the households, and the extent of the usage of such practices was examined. The study revealed innovative, smart and frugal reuse practices adopted by households, and informed that extent of reusability differs across various income groups.

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1. Introduction

Most cities in developing countries in Asia are struggling to contain and manage the increasing volumes of daily household waste generated within and beyond the municipal boundaries. In India, the urban population has been growing manifold, especially in the decades following independence from colonial rulers in the year 1947. In the year-2011, for the first time in India's demographic history, the absolute increase in population was more in the urban areas compared to the rural areas (Census of India (2011)). Despite this voluminous population growth and changes in lifestyle fuelled by the economic growth, the amount of per capita daily waste generation in urban areas in India remains much lower compared to developed economies (CPHEEO, 2015). The per capita waste generation ranges from 1.1 to 3.7 kg/capita/day with an average of 2.2 kg/capita/day in developed countries (Hoorweg and Bhada-Tata,

2016) as compared to 0.5kg/capita/day in India (CPHEEO, 2015). Various waste-recycle, reduce and reuse practices have been a part of Indian households since time immemorial. At household as well as institutional level, emphasis is always on exploiting material utility to its maximum, and often beyond the end of the functionality of its original use. There is a general tendency to invariably put the material to some other use after its utility or functional-life for its original purpose is over, and to keep on using it for one or the other purpose till such a time that it cannot be put to any further use. Such 'reuse' measures are profoundly practiced to achieve cost as well as material-life efficiency. However, these practices can also be called 'eco-friendly' as they promote 'reuse and recycling', and hence have been termed as 'green practices' in this study. National Geographic Greendex, conducted by GlobeScan across 18 countries, revealed that developing countries constitute the top tier of the Greendex rankings, while the bottom tier is occupied by developed countries, with Indian consumers ranked first (<http://environment.nationalgeographic.com/environment/greendex/>). The study found that, among Indians, the usage of their own bag for shopping has increased since 2012 (National Geographic, 2014).

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India is home to 1.21 billion people, of which 377 million people live in urban areas of varying sizes ranging from megacities to small-towns. The level of urbanization has increased from 27.81% to 31.16% during 2001–2011 (Census of India (2011)). Rapid urbanization in India has also been accompanied by changes in lifestyles and increase in consumption patterns. Urban population growth and increase in per capita waste generation from 0.44 kg/day in 2001 to 0.5 kg/day in 2011, has resulted in 50% increase in the overall volume of waste generated by Indian cities within a decade (Shekhar, 2014). Per capita waste generation in cities varies from 0.2 kg to 0.6 kg per day depending upon the size of the population (EBTC, 2011; CPHEEO, 2015). This waste generated is expected to increase by 5% annually (Narain and Sambyal, 2016). There are 53 cities in India with a one million plus population, which together generate 143,449 tons/day of waste, and out of which 32,871 tons/day is reported to be processed (Central Pollution Control Board, 2015), which is 23% of the waste generated. An increase in the volumes of waste has already started posing serious challenges to the available natural, infrastructural and budgetary resources related to solid waste management. Urban managers have been struggling to find ways and means to reduce the generation of waste, as well as its treatment and disposal.

The objective of this paper is to understand the existing waste generation patterns and identify green practices adopted at the household level. This paper focuses on how local green practices can be advanced in the face of growing 'consumerism', to meet the goals of sustainability in our society. The attempt is to document and analyze the prevailing practices that help in reducing the generation of waste. The waste practices associated with generation, reuse, and recycle, have been documented and investigated through a primary survey in the city selected for this case study, for nine material categories of waste.

1.1. Sustainable consumption and household waste

Managing household waste is a global issue having adverse implications on human health and the environment. Waste generation is directly related to consumption patterns of people, and the methods used in the production and packaging processes. The term sustainable consumption (associated with demand of materials), is widely defined in conjunction with 'sustainable production' (addressing supply of materials) for sustainable development. The United Nations Environment Programme (UNEP) defined 'Sustainable consumption and Production', emphasizing on minimizing the use of natural resources, toxic materials, and emissions of waste and pollutants over the life cycle of the product. Various actions to nurture 'sustainable consumption' includes recycling, waste minimization, and resource efficiency measures (Bentley, 2008).

Globally, waste generation per capita has risen markedly over the last 50 years and shows a strong correlation with income levels (CPHEEO, 2015). The share of biodegradable waste in low and middle income countries is higher compared to high income group countries, whereas waste material consisting paper, glass, and metals is generated more in high income countries (UNEP, 2015; CPHEEO, 2015). As the population grows along with the economy, the per capita Municipal Solid Waste (MSW) generation also increases (Damghani et al., 2008; Sujauddin et al., 2008). Therefore, the most important approach for the management of household waste in the future is to achieve a reduction in the generation of waste through modifying consumption patterns (Damghani et al., 2008). The projected urban population growth, along with the projected rise in the per capita income of low and middle-income countries in the next couple of decades, requires devising and implementing innovative and effective policies and practices to promote waste prevention (UNEP, 2015).

Environmental pressure from households is projected to significantly increase by 2030 (OECD, 2008). The increased purchasing capacity of consumers in the Asia Pacific Region demands adoption of green consumerism for sustainable consumption. Tseng et al. (2013) emphasized on suppliers to incorporate recovery and reuse of used products in their marketing process. The demand for recycled products, economic conditions, weight reduction (reduction of packaging waste), product reuse, consumption behavior, quantity and types of competitive recycled products, and developing a social or legal system for green purchasing also indirectly influence waste generation (Fujii et al., 2014). 'Green purchasing' mentioned in this paper refers to buying products that have less adverse impact on the environment and human health, as compared to competing products. The empirical studies (OECD, 2008) carried out to assess the impact of Socio-Economic and Demographic (SED) variables on household decisions over waste disposal and recycling, concluded that it does get affected by SED variables. The waste composition varies with the socio-economic status within the community, as income determines life-style, consumption pattern, and cultural behavior (CPHEEO, 2015).

The use of the '3Rs' concept, that refers to 'reduce', 'reuse', and 'recycle' of waste materials at the household level to reduce 'generation of waste', contributes towards achieving sustainable consumption. The 3Rs initiative proposed by Japan in 2004 advocates for establishment of Sound Material Cycle Society (SMCS), that focuses on reducing generation of waste from products by suitably utilizing waste generated as resources, and appropriate disposal of waste that cannot be used in any possible way (Yoshida et al., 2007). The UNEP (2011) report highlighted that 'waste management hierarchy' based on the internationally recognized approach of Integrated Solid Waste Management (ISWM), stresses on preference to be given to three R's: Reduce, Reuse and Recycle. The waste management hierarchy focuses on avoidance and minimization of waste, promoting 3R's and implementing safe transportation, treatment and disposal of waste with emphasis on maximizing resource use efficiency. Another similar approach based on the concept of 'Zero Waste' also considers 'waste' as a resource to be used again rather than as a material to be disposed off or incinerated, and advocates for the prevention of waste rather than its treatment (Zaman, 2016). Management of solid waste can be achieved through certain approaches which are: community based; decentralized; low cost; low technology; and based on the principles of 3R; offering municipalities sustainable solutions. Moreover, the high percentage of organic solid waste averaging 50–80% provides opportunities for converting waste into a resource in developing countries (Diaz and Otama, 2013).

A comprehensive study to identify and document the 'green' ways used conventionally by inhabitants for managing household waste, will help in encouraging the application of the '3Rs' concept rather than continuing with 'disposing discarded waste' system. The percentage share of MSW (household: 24% and commercial: 11%) in total waste generated worldwide is placed second after construction waste, whose share is 36% (UNEP, 2015). This shows the significance of the household sector in the generation of solid waste at the global level.

1.2. Green practices and technologies for reduction of waste generation

The green practices and technologies of 'reuse' and 'recycle', adopted globally to reduce disposal of waste to landfill sites, are identified in this section to understand the accepted formal structure for the selected waste material. Green practices can lead to more environment friendly and ecologically responsible decisions and lifestyles (Middletown Thrall Library, 2008). More specifically,

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