Waste Management in Hotel Industry in India: A Review

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Abstract- Hotel industry, in recent years, has been a major consistent force behind the tremendous growth in Indian GDP. It has also fueled the increase in number of hotels around the country. Hotels are the major consumers of resources and contribute heavily toward the waste generation, as compared to others.

Today is the Green Economy era and green strategies, like recycling can provide a great benefit to hotel industry. In this study, we reviewed literature in waste-audit, WARM model, equivalency calculator and cost benefit analysis techniques on hotel properties and examining the current status of waste management for some hotel industry in India. An account is given of the causes of the different types of waste encountered in this sector and what strategies may be used to reduce them. Generally, there is a lack of scholarly publications to support this area of research. This paper presents an overview of current waste management practices in India and suggests solutions to some of the major problems.

Presently there are improper waste management practices in hotel industry. And lack of suitable facilities (equipment and infrastructure) and underestimates of waste generation rates, inadequate management and technical skills, improper collection, and route planning are responsible for poor collection and transportation of municipal solid wastes.

The main objective of present study is about the management of hotel waste to create sustainable business along with generating profit from waste. It reveals that proper management of waste can lead to higher profitability for hotel and save environmental pollution.

Keywords- Hotel Industry, GDP, Waste Management, Sustainability.

I. INTRODUCTION

The Indian tourism and hospitality industry has emerged as one of the key drivers of growth among the services sector in India. The third-largest sub-segment of the services sector comprising trade, repair services, hotels and restaurants contributed nearly US$ 187.9 billion or 12.5 per cent to the Gross Domestic Product (GDP) in 2014-15, while growing the fastest at 11.7 per cent Compound Annual Growth Rate (CAGR) over the period 2011-12 to 2014-15. Tourism is a potentially large employment generator besides being a significant source of foreign exchange for the country. The industry is expected to generate 13.45 million jobs. Figure 1 shows : sub-segments such as Restaurants, (10.49 million jobs), Hotels (2.3 million jobs) and Travel Agents/Tour Operators (0.66 million) (IBEF,a).

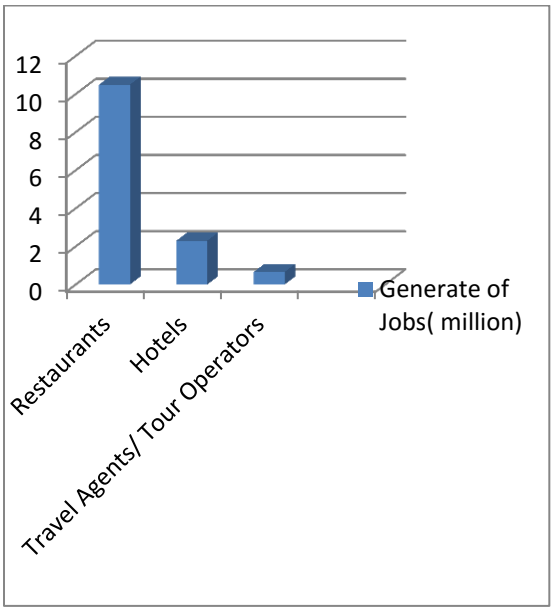

Figure 1: Generate of jobs (per million) (IBEF,a)

Total contribution by travel and tourism sector to India's GDP is expected to increase from US$ 136.3 billion in 2015 to US$ 275.2 billion in 2025. Travel and tourism is the third largest foreign exchange earner for India. In 2014, the country managed foreign exchange earnings of USD 19.7 billion from tourism (IBEF,b).

The hospitality industry in many parts of the world is expected to see significant rates of growth in the next few years. Most human activities create waste, and the way this waste is handled, stored, collected and disposed of can pose risks to the environment and to public health (Zhu et al., 2008). With the increase of business activities as well as rapid urbanization, the generation of waste has also increased. Improper management of this waste has led to various hazards not only for human beings but also for the whole ecosystem. Recycling has been at the forefront of successfully managing the problem related to waste. It is one of the processes that is used in Integrated Solid Waste Management (ISWM) along with reduce and reuse (Memon, 2010).

In one of the studies conducted in Bali, it was found that participation in a waste management program provided direct economic benefits to the hotels (through waste minimization), indirect benefits such as a better corporate image, and avoided costs (liability) (Tang,2004; Vahatiitto, 2010).

Studies have shown that tourists (hotel guests/clients) are willing to pay more for environmental friendly products and services such as hotel accommodation (Kang et al.,2012; Masau and Prideaux, 2003). Many hotels are practicing environmentally friendly policies and recycling to manage waste, which is benefitting them by an increase in profit and getting positive customer response and improved corporate brand image (IHRA, 1995).

In this work, our goal is to provide a comprehensive review of the status of waste management in today's hospitality industry in India. Such a review will be of relevance and benefit to management in hotel industry, and help to economic sector and minimize the ecological footprint.

II. Research Elaborations

1. waste from the hospitality industry

Generally speaking, waste from the hospitality industry consists of both wet (organic/biodegradable) and dry waste. The wet waste consists primarily of food waste (Wagh, 2008), which can account for more than 50% of the hospitality waste (Curry, 2012) and up to one third of all the food served within the hospitality sector (Marthinsen et al., 2012).

Hotels are one of the major sources of solid waste generation, for reducing the volume of the waste, Kirk (1995) focused on purchasing policies (develop partnership, products with sensible packing), waste management (minimize waste in the operation, reuse and recycle) and waste disposal (partnership with disposal companies, sound disposal methods) by hotel to meet environmental responsibility and reduce the burden of waste. Considering the significant role of the hotel industry in terms of waste generation(half a pound to 28.5 pounds of trash per day per room) and the fast growth of the industry, adopting a number of environmental best practices with quantifiable measures, including areas of benchmarking and auditing, financial analysis to facilitate informed decision making, and operational training, becomes important due to certain factors such as increasing regulation and rising utility costs (Goldstein and Primlani, 2012). This study helps to understand the waste generation and its management for estimating the monetary benefits of recycling for the industry and the environment. Findings of this study support the instrumental stakeholder theory.

The expansion in hospitality sector operations is complemented by an expansion in its waste management operations. More waste usually translates into a greater environmental footprint and therefore more harm to the ecosystem. For example, a hotel guest is estimated to generate up to 1 kg of waste per day on average (International Hotel Environmental Initiative, 2002), and this amounts to millions of tons of waste being generated worldwide annually. Therefore, the importance of studying the hotel management in order to minimize the waste cannot be overemphasized.

For a hospitality business, the cost of solid waste management includes various factors such as the disposal and transport of waste, as well as associated labor costs (Todd and Hawkins, 2003).

Therefore, more efficient waste management can help lead to significant savings for the business depending on where the business is located and the waste management regulations in that area.

Other benefits of ecofriendly waste management include an improved business image, reduced carbon emissions from the decreased transportation of waste, reduced costs due to smaller order requirements from suppliers, improved relations with stakeholders, reduced risks and liabilities, and health and safetybenefits (Ball and Abou Taleb, 2010).

Waste generation is one of the complex issues now days as it emerges as a global problem for environment and human health. Hotel industry is main source of waste generation, a large chunk of waste generated from hotels lodging, storing and kitchen areas. Managing waste positively affect social, economic and environmental issues of countries and organization (Rohweder, 2008).

2. Characterization and quantification of waste in the hospitality industry

Various studies have showed some light on the typical waste types generated at hotels. For instance, aluminum, plastics, glass, steel, cardboard and food waste were cited as being the main components of hotel waste in some studies (Axler,1973; Kirk,1995). As per another study (Zein et al., 2008), the components of hotel waste along with their sources are shown in Tables 1, which show non-hazardous types of waste.

Table 1: Types of non-hazardous waste in the hotel industry (based on the work of Zein et al., 2008)

Non-hazardous Waste Type	Components	Source
Household wastes	Food/kitchen waste, used or dirty paper and wrapping, plastic wrapping or bags, composted wrappers	Hotel's different departments
Cardboard	Packing	Hotel's purchasing and other departments
Paper	Printed documents, brochures, menus, maps, magazines, newspaper	Administration, reception, guests room, restaurants
Plastic	Bags, bottles (hat did not contain hazardous material), household goods, individual portion wrappers for various products	Kitchen, restaurants, bars, guest room, Administration
Metal	Tin cans, jar lids, soda cans, food containers, mayonnaise, mustard and tomato puree tubes, aluminum packing	Kitchen, restaurants, bars, guest room
Glass	Bottles, jars, flacks	Kitchen, restaurants, bars, guests rooms
Cloth	Table cloth, bed-linen, napkins, clothes, rags	Kitchen, restaurants, bars, bathrooms, guests rooms
Wood	Wooden packing pallets	Purchasing department
Organic waste	Fruit and vegetables peelings, flowers and plants, branches, leaves, grass	Kitchen, restaurants, bars, guests rooms, gardens

It is also clear from Table 1 that multiple types of waste tend to be generated at individual locations. The relative percentage of each of these different waste types also varies by establishment. The waste composition values, provided by different publications in chronological order, are presented in the first section of Table 2. Only publications which have specifically reported quantities for waste types constituting hospitality waste are mentioned.

Table 2: Results from various studies on quantifiers and composition of hospitality waste

Reference	Study location	Study period	Waste quantities/calculation (per day)	Data source
(AMAR NATH, 2014)	New Delhi, Noida, Greater Noida, Ghaziabad and Gurgaon	2013	FOOD/WET 61.2% WASTE, 0.8% PLASTIC PET BOTTLE, 1.5% OTHER/MIXED PLASTIC, 0.5% TETRA PAK (Laminated Paper), 0.47% ALUMINIUM, 14.8% GLASS, 6.1% NEWSPAPER, 0.7% MIXED OFFICE PAPER, 13.7% CARDBOARD, 0.2% TRASH (Laminated Plastic)	Study of eight hotels
Nripendra Singh et al., 2014	Pennsylvania	2013	10% Plastic bottle, 2% Other plastic, 3% Terracycle, 5% Aluminium, 6% Glass, 7% Newspaper, 6% Mixed office, 2% Cardboard, 47% Compost, 13% Trash in hotels with F&B services and 17% Plastic bottle, 6% Other plastic, 5% Terracycle, 12% Aluminium, 14% Glass, 3% Newspaper, 5% Mixed office, 6% Cardboard, 19% Compost, 12% Trash in hotels without F&B services	Study of 3 hotels with F&B services and 2 hotels without F &B services
(Do Nam Trung, S. Kumar, 2003)	Vietnam	Not dated	41% Food waste, 21% Plastics Packing, Paper, 5% Aluminium cans, metal, glass, 4% Garden waste, 27% Others	Solid waste in stars hotels (more than 30 hotels)
(Parfitt et al., 2013) *	UK	2012	37% food waste, 18% paper, 7% cardboard, 15% plastics, 10% glass, and 13% other	Study of 35 hotels
(WRAP UK, 2012a,b) *	UK	2009-h2010	41% food waste, 13% paper, 9% cardboard, 10% plastics, 14% glass, and 13% other	Study of 138 hospitality industry businesses

3. Solid waste management in the hospitality industry

Solid waste is a key concern in the hospitality industry. Typically, a hotel guest can produce 1 kg of waste a day that accumulates to thousands of tonnes of waste annually (IHEI, 2002). Many small hotel operators have very little interest in reducing and/or recycling waste, believing that such activities are too expensive and time-consuming (Chan & Lam, 2001). For a hotel business, the cost of solid waste is not only the cost of disposal but includes other hidden costs, i.e. staff, resources and energy (Todd & Hawkins, 2007).

Cummings (1997) developed a hierarchy model of hospitality SWM. The model introduces five levels for waste minimisation including commit to waste minimisation, purchase with eco-intelligence, use efficiently to generate less waste, reuse waste materials and segregate and recycle waste. However, Cummings's model will not be applicable to hoteliers who have negative attitudes towards the implementation of more sustainable SWM practices as the model does not have any system of motivation and/or pressure to influence hoteliers' behavioural intentions in relation to SWM. It is essential to educate and train staff about waste minimisation practices, along with providing incentives to

enhance their commitment to the programme (Cummings, 1997; Trung & Kuma r, 2005). Cummings (1997) indicated that customers can play an important role in a hotel's waste recycling programme by not contaminating waste with food. A range of methods can be used to encourage customers to segregate their recyclable materials, i.e. providing another bin in the room or near lifts for recyclable materials. Hayward (1994) indicated that customers' attitudes towards the environmental issues had changed positively. Many hotels reported high customer participation rates in hotel waste recycling programmes, e.g. Disneyland resort in Anaheim and Disney World.

4. Waste hierarchy

This model was given by European Union (EU) strategy on waste (Williams, 2005; Gervais, 2002). The waste hierarchy provides order for the best environmental options which have least impact on environment, and supports sustainable waste management (UK Government Strategy Unit, 2002).

The waste hierarchy introduced by Waste on Line (2006) provides a range of options to handle different waste streams (prevention, minimisation, reuse, recycle, energy recovery and disposal) (see Figure 2). Prevention is the elimination of waste before it is actually created. Minimisation is the reduction of waste during the life cycle of the product. Reuse is a process of putting waste materials back into use so that they do not go into the waste stream. Recovery is the retrieval of a part of the value of the materials through recycling and energy recovery. Disposal, at the bottom of the hierarchy, usually involves landfill and incineration of waste (Baker & Vandepeer, 2004). However, the waste hierarchy did not address composting, which was an essential SWM option for handling organic waste in a sustainable way (Webster, 2000).

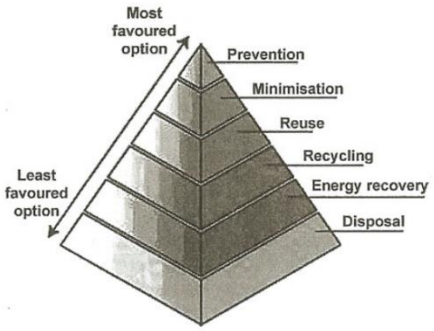

Figure 2. The SWM hierarchy.Source: Image reproduced, courtesy of Cardiff County Council

The purpose of the waste hierarchy is to give priority to waste prevention. Failing that it aims to promote the re-use and recovery of waste. Food waste collection and composting fit into the recycling stage of the waste hierarchy. Only when all other options have been considered, should waste be disposed of, usually in the form of landfill. The higher up the waste hierarchy a waste management strategy is, the more sustainable it is. The purpose of the waste hierarchy is to give priority to waste prevention. Failing that it aims to promote the re-use and recovery of waste. Collection of food waste and composting fits into the process of recycling. Only when all other options have been considered, should waste be disposed of, usually in the form of landfill. The higher up the waste hierarchy a waste management strategy is, the more sustainable it is(Amar Nath, 2014).

Impact of Population Growth on Municipal Solid Waste (MSW) Generation in India:

Population growth and rapid urbanization means bigger and denser cities and increased MSW generation in each city. The data compiled for this report indicates that 366 cities in India were generating 31.6 million tons of waste in 2001 and generated 47.3 million tons in 2011. It shows 50% increase in one decade. It is estimated that these 366 cities will generate 161 million tons of MSW in 2041, a five-fold increase in four decades. At this rate the total urban MSW generated in 2041 would be 230 million TPY (630,000 TPD) (Annepu, R.K.,2012).

Table 3: Population Growth and Impact on Overall Urban Waste Generation and Future Predictions until 2041

Year	Population (Millions)	Per Capita	Total Waste generation Thousand Tons/year
2001	197.3	0.439	31.63
2011	260.1	0.498	47.3
2021	342.8	0.569	71.15
2031	451.8	0.649	107.01
2036	518.6	0.693	131.24
2041	595.4	0.741	160.96

Source: Adopted from Annepu, R.K (Annepu, R.K.,2012)

MSW Rules 2000 mandate "landfills should always be located away from habitation clusters and other places of social, economic or environmental importance", which implies lands outside the city. Therefore, increase in MSW will have significant impacts in terms of land required for disposing the waste as it gets more difficult to site landfills (DEA, 2009).

5. Data analysis

For analyzing the date, four major tools should be done i.e. waste audit, WARM Model (Waste Reduction Model), Equivalency calculator and cost benefit analysis. Waste audit calculate the amount of waste generated from hotel. WARM model calculate the rate of emission generated from hotel waste in a year. Equivalency calculator use to calculate usable emission generated from waste to other sector and finally, cost benefit analysis use to calculate the cost of implementation of green practices and its monetary and nonmonetary benefit. Then a model should be developed to manage the wastes.

5.1. Waste audit

Hotel industry is the main source of waste generation, which is directly sent to the landfill sites without any proper treatment (McCoy, Bacot and Galvan, 2002). Hotels in India contribute to the generation of overall waste. As the study suggested by Wagh that hotel industry up to thirty per cent of the total waste generated.

A first step to a waste management program is a waste audit. Author will investigate the audit sheet waste which is classified into recyclable, compostable and inert waste. Recyclable wastes are those wastes, which can be processed by alternative techniques or procedure to convert into by-products or any useful material. Compostable waste like food waste, leftover foods, kitchen waste etc. are recycle in the form of composting to convert valuable manure, a perfect soil conditioner. Finally, inert waste like laminated plastic products or mixed waste that are not in the position to process to convert any valuable item that's why these wastes are directly sent to the landfills? (Aamar Nath, 2014). Audit was conducted randomly, without any prior notification given to these hotels to ensure unbiased audits and avoid any deliberate action by hotels to manage their recycling status.

- **Identification of process of profitability from waste management practices in hotels:**

5.1.1: Literature review and published reports

There are some important research studies on types of waste produced by hotels. For example,

Axler (1973), Kirk (1995) and Taleb (2005) indicated that hotel waste is generated in the form of glass, steel, cardboard, aluminum, plastics, and food. Each of these waste materials has different degenerate time, which is based on the composition of waste material (Rajput, R. and et al., 2009). A waste audit is most formal a dwell-structured process to quantify the amount of waste generated by any organization.

5.1.2: Developed waste audit form

It is developed on the basis of various literature reviews, waste samples examined and different waste material weights and/or volumes calculated.

5.1.3: Expert Validation

After developing waste audit sheet it was tested to one of the hotel but results were not satisfactory because in India especially in hotel industry there is no provision of waste segregation and with the lack of proper waste segregation, the

audit sheet is not filled well, hoteliers don‟t have any proper detail of each waste material. Then with the help of hotel industry experts, audit sheet was validated. As recommended by Hardesty & Bearden (Hardesty, and Bearden, 2004), audit sheet was again reviewed by the judges; persons that are expert in that specific domain area(Nath, 2014).

5.1.4: Developed Final Audit Form

After completing expert validation, a final and more systematic audit form is developed after some changes. In the final audit form the first column shows the category of type of waste material i.e. recyclable, compostable or direct landfilling. Each hotel can audited 5 times a day with particular dates. Second column shows the name of the hotel, date, day and waste detail. Second last column was used to calculate the average of all 5 day auditing. And last column shows the percentage of each waste material in a particular hotel per day(Nath, 2014).

-Pilot study: Customer preferences for green hotels

Before going to the depth of research a pilot study has been conducted. In pilot study, customer survey is used to know whether the customers are interested to stay in green practices based hotel or not. Also it is used to know the most prominent factor for implementing green practices in any hotel. After specifying and defining the domain theobjective of the study is to generate a large pool of items through various techniques like literature review, experts‟ feedback, various reports and industry-specific descriptions are used to generate the list of items(Nath, 2014).

a. Warm model

WARM model is one of the best alternatives to estimate GHG emission because of waste characterization feature and alternative method to reduce each type of waste.

The share of organic/compostable content in hotel waste is higher due to consumption pattern, life style, food habits and culture in India. But it is not segregated at the source, which makes it unfit for composting, and the waste which is composted in its current form, generate low or poor quality of compost. Also due to improper segregation of waste, combustion technique in India is not suitable enough. It is for this reason that various wastes to energy (WTE) or combustion plants are either shut down or operate at a loss. Waste material like aluminum cans, steel cans, all type of papers, cardboard and plastics are easily recycled among hotels in India. Remaining waste like inert materials and mix waste (non-segregated waste) mainly wet waste, goes to the landfill(Singh et al., 2014).

In WARM model the first step is to calculate baseline scenario. It is used to calculate the emission according to current practice of waste disposal. Next step in WARM model is alternate scenario which is suggestive in nature, and shows that if the waste is utilized/managed properly by recycling, composting or combustion depending on the type of waste, can lead to reduction in total emission.

Table 4:Type of waste generation in hotel industry

Category of waste	Waste Reduction by	Category of waste	Waste reduction by
Aluminium Cans	Recycle	Grass	Combusting
Aluminium Ingot	Recycle	Leaves	Combusting
Steel Cans	Recycle	Branches	Combusting
Copper Wire	Recycle	Mixed Paper(general)	Recycle
Glass	Recycle	Mixed Paper(primarily residential)	Recycle
HDPE	Recycle	Mixed Paper(primarily from office)	Recycle
LDPE	Recycle	Mixed Metal	Recycle
PET	Combustion	Mixed Plasticizers	Recycle
LLDP	Recycle	Mixed Recyclables	Recycle
PP	Recycle	Mixed Organics	Combusting
PS	Recycle	Mixed MSW	Combusting

PVC	Recycle	Carpet	Recycle
PLA	Recycle	Personal Computers	Recycle
Corrugated Containers	Recycle	Clay Bricks	Recycle
Magazines/Third-class Mail	Recycle	Concrete	Recycle
Newspaper	Recycle	Fly Ash	Recycle
Office Paper	Recycle	Tires	Recycle
Phonebooks	Recycle	Asphalt Concrete	Recycle
Textbooks	Recycle	Asphalt Shingles	Recycle
Dimensional Lumber	Recycle	Drywall	Recycle
Medium-density Fire board	Recycle	Fibre glass Insulation	Recycle
Food Scraps	Combusting	Vinyl Flooring	Recycle
Yard trimmings	Combusting	Wood Flooring	Recycle

Source: Adopted from United States Environmental Protection Agency (USEPA, 2013) (WARM Model)

The average waste generated per hotel is derived on daily basis by Auditing in Kilograms (kg). further it is multiplied by 365 days to calculate average number of waste generated from a single star rated. Finally, value divided by 1000 to convert it to tons. This will show the emission generation ratio from a single star rated hotel. Thus, the entire weight of all waste material is received in terms of yearly basis (Nath, 2014).

b. Equivalency calculator

Equivalency calculator is a tool developed by United States Environment Protection Agency (USEPA). This tool was used to show the optimum utilization of GHG emission to other sector. It may be useful in communicating the greenhouse gas reduction strategy, reduction targets, or at reducing greenhouse gas emissions.

Equivalency calculator the emission analysis in other sector like passenger vehicles, gasoline consumed, oil consumed, tanker trucks‟ worth of gasoline, electricity use, energy use, deforestation, propane cylinders, burning railcars‟ worth of coal, emissions from waste sending to the landfill, emissions from coal fired power plants, etc. (Nath, 2014).

c. Cost benefit analysis

Cost benefit analysis, is promising in order to show the potential of waste management and its positive implementation to hotel industry as well as to the environment. The key objective is to reduce their generation of emissions and pollution at the source.

Net benefit = Benefit - Cost

There are various methods for waste treatment according of the nature of waste. There are:

Treatment of recyclable waste and treatment of compostable waste.

5.2. Treatment of recyclable waste

According to Nath (2014), there are many different ways to treat waste. Paper waste are treated with repulping technique to convert paper and paperboard products.

Plastic waste are treated with the help of Extruder Machine, Injection moulding, Blow moulding, Film blowing and depolymerisation Process (the plastic is melted and chemically broken down) and Fluidized bed reactor to convert into bottles and jar. Textiles waste are treated with the help of Remanufacturing process, Lyocell process, Patagonia process and Textile incineration to convert into reusable cloths. Glass waste is treated with Cullet- Glass crusher. Metals waste are treated with the help of Ferrous metal shears. Garden waste and food waste are treated with the process of composting and convert manure from it.

5.3. Treatment of compostable waste

Hotel organic waste can be reduced by composting as a best alternative. It is a biological process of decomposition of organic wastes within certain condition like proper ventilation, temperature, moisture and carbon and nitrogen ratio(MSW Manual, 2000). Compost is useful manure and perfect soil conditioner. Composting is basically depending on the nature of 119 waste and its decomposition process. In the manual of

municipal solid waste management (MSW manual, 2000) there are two methods of composting describes i.e., aerobic and anaerobic. Apart from that another form of composting is vermicomposting, in which various species of earthworm are used to convert organic waste into manure(Nath, 2014).

6. Model or framework development

A holistic framework is developed for hotel industry with special focus on profitability. It can be proved that waste is revenue earning source for effective waste management in hotel industry. Framework will create options to save the cost paid to the local vendors and save labour cost for waste handling. Hotel waste management model is classified into: Profitability aspect and sustainable aspect (Pictorial representation of aspects of hotel waste management framework).

6.1 Profitability from recyclable and compostable waste

Profitability means the ability to generate profit from all the available business activities of an organization or firm. It is a return of given investment. It is a tool to boost or increase the overall profit by any systematic strategy. Here waste material work as profit enhancer. These waste items can generate some handsome amount of revenue; the two major source of profit is organic waste and recyclable waste(Nath, 2014).

Profitability from waste can be classified as: Saving from wet/ organic waste and saving from salvage value of recyclable waste (Source: Pictorial representation of profitability options).

This is the first outcome phase of the model of waste management for hotel industry. Profit can be generated from bio-degradable waste and non-biodegradable waste and we can estimate the monetary and non-monetary value of waste. According to Nath(2014), the collected waste are segregated and categorized into three parts i.e. biodegradable waste/organic waste/wet waste or recyclable waste and inert/landfill waste.

Wastes are properly treated according to the characteristic and composition. Biodegradable waste is sorted for composting process or biogas plant. If the volume of waste and land for waste treatment is limited then the best suit option is biogas. Otherwise if the volume of waste is higher or there is availability of land than composting is appropriate for waste treatment. Similarly once the waste are sorted in the form of recyclable waste again recyclable waste are categorized into sub category like metal waste, plastic waste, paper waste etc. Now the sub categorized waste are sell to concerning recycling units or scrap dealers to get salvage value of each material(Nath, 2014).

6.2 Sustainability from waste management

Sustainability is everything that need for the existence and survival of well-being that depends, either directly or indirectly on the natural environment. It creates as well as maintains the required conditions in which humans and nature can survive in a productive manner. Sustainability consists of three major aspects that is social, economic and environmental(Source: Pictorial representation of sustainability aspect). Any model, framework, strategy, blueprint etc. are only said to be sustainable if these three aspects are within.

III. Conclusion

Waste production from hotel industries is one of the major issues in Indi because waste is not treated well. Therefore, develop a holistic framework for waste management has important role in the optimization of each waste material in hotel industry. Most of the wastes in hotels are recyclable or compostable.

The study shows that hotels can not only make environmentally friendly contributions, but also make profits out of a proper recycling practice in a long-term. Waste elimination at source and recycling can saves GHG emission to a large extent. Therefore, it can decrease pollution and slow down global warming, which is a major problem mankind is facing nowadays.

Proper waste management strategy shows that a thorough literature review along with experts interviews done by researcher, waste audit form for the calculation of waste volume can be prepared. Then the impact of waste on

environment was calculated with the help of WARM Model and equivalency calculator. And the next most important analysis is cost benefit. And the last step is to develop the best framework or model which explain the value of profitability and sustainability.

Waste Management is serious issue that needs public awareness and governmental attention immediately.

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