AN ADVANCE ELECTRONICS DUSTBIN FOR WASTE MANAGEMENT SYSTEM

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Abstract - The waste production in the recent time has increased tremendously in the world as well as in India. The management of this large amount of waste is very difficult and hence due to the poor waste management it is producing lots of problems and health related issues. To simplify the waste management issue we have designed an advance waste management system which is mainly comprises of E-buckets, centralized controlling system, web portal and an android application. It is a digital system which is able to provide the information about the amount of waste collected in each dustbin all over the city, location of all the dustbins, way to reach the dustbins and type of the waste material every second so that we can collect the waste on the proper time with the convenience. The given advance waste management system helps to reduce the labor cost and transportation cost of the waste management and plays a vital role in the improvement of the human health and environmental health of the city due to proper waste management.

Keywords - Advance Waste Management Unit, Waste Collection, E-Bucket Application, E-Bucket Web Portal, Recycling.

I. INTRODUCTION

"There square measure few things bound in life – one is death, second is amendment and the different is waste." nobody will stop this stuff to require place in our lives. However with higher management we are able to prepare ourselves. Here we are going to talk about waste and waste management. Every folks features a right to wash air, water and food. This right will be consummated by maintaining a transparent and healthy environment. Currently for the primary question, what's waste? Any material that is not required by the owner, producer or processor is waste. Generally, waste is outlined as at the tip of the merchandise life cycle and is disposed of in landfills. Most businesses outline waste as "anything that doesn't produce value" (BSR, 2010). In an exceedingly common man's eye something that's unwanted or not helpful is garbage or waste. But scientifically speaking there's no waste per se within the world. Most the elements of solid waste have some potential if it's regenerate or treated in an exceedingly scientific manner. Hence we can outline solid waste as "Organic or inorganic waste materials made out of family or industrial activities, which have lost their price within the eyes of the primary owner however which can be of nice price to someone else." (Robinson, W.D.1986). Generation of waste is inevitable in each habitation howsoever massive or little. Since the dawn of civilization humanity has gradually deviated from nature there has been a forceful amendment in the lifestyle of human society. Direct reflection of this modification is found within the nature of garbage that a community generates. we are able to dispose the waste or utilize the waste and may earn cash through correct management. Indian cities that square measure quick competitor with international economies in their drive for quick economic development has thus far didn't effectively manage the large amount of waste generated. There square measure regarding 593 districts and more or less five, 000 cities in India. About 27.8 p.c of India's total population of quite one billion (as per Census 2001) lives in urban areas. The projected urban population share is thirty three.4 p.c by the year 2026. The quantum of waste generated in Indian cities and cities is increasing day by- day on account of its increasing population and exaggerated GDP. The annual amount of solid waste generated in Indian cities has exaggerated from six million tons in 1947 to forty eight million tons in 1997 with associate annual growth rate of 4.25 percent, and it's expected to extend to three hundred million tons by 2,047 (CPCB, 1998). Population explosion, plus improved life sort of folks, results in exaggerated generation of solid wastes in urban yet as rural areas of the country. In India like all different sectors there's a marked distinction between the solid waste from urban & rural areas. However, thanks to ever increasing urbanization, quick adoption of 'use & throw concept'& equally fast communication between urban & rural areas the gap between the 2 is diminishing. The solid waste from rural areas is a lot of a perishable nature from urban areas contains a lot of non-biodegradable components like plastics & packaging. The offensive angle towards solid waste & its management is but, common in each the sectors. Universally 'making garbage out of sight' is that the unremarkably followed practice. In India, the urban

native bodies popularly referred to as the municipal corporations/councils, square measure answerable for management of activities associated with public health. However, with increasing public and political awareness as well as new prospects opened by economic process, solid waste management is beginning to receive due attention. The varied initiatives taken by government, NGOs, non-public corporations, and native public drastically increased within the past few decades. Withal, land filling remains the dominant solid waste management possibility for the us yet as many different countries like India round the world. It's acknowledge that waste management policies, as they exist currently, aren't property within the long run. Thus, waste management is undergoing forceful amendment to supply a lot of choices that square measure a lot of property. we glance at these choices within the hope of providing the waste management business a a lot of economically viable and socially acceptable resolution to our current waste management quandary. This paper outlines numerous advances within the space of waste management. It focuses on current practices associated with waste management initiatives taken by India. It also highlights some initiatives taken by the America centralized, states and business teams. the aim of this paper is to realize information regarding various initiatives in each countries and find the scope for improvement in the management of waste.

1.1 Waste produce in world:

Around the world, waste generation rates are rising. In 2012, the worlds' cities generated 1.3 billion tonnes of solid waste per year, amounting to a footprint of 1.2 kilograms per person per day. With rapid population growth and urbanization, municipal waste generation is expected to rise to 2.2 billion tonnes by 2025.

Compared to those in developed nations, residents in developing countries, especially the urban poor, are more severely impacted by unsustainably managed waste. In low and middle-income countries, waste is often disposed in unregulated dumps or openly burned. These practices create serious health, safety, and environmental consequences. Poorly managed waste serves as a breeding ground for disease vectors, contributes to global climate change through methane generation, and even promotes urban violence.

Managing waste properly is essential for building sustainable and liveable cities, but it remains a challenge for many developing countries and cities. Effective waste management is expensive, often comprising 20-50% of municipal budgets. Operating this essential municipal service requires integrated systems that are efficient, sustainable, and socially supported.

The World Bank study projects a 70% global increase in municipal solid waste by 2025– with developing countries facing the greatest challenges as their waste is expected to more than double.

The projected amount of waste will rise from 1.3 billion tons per year today to 2.2 billion tons per year by 2025. The projected annual global costs will rise from $205 billion to $375 billion per year.

Buying and selling waste at market rates is part of our world economy. Poorer, more rural, countries become dumping grounds for the world's most challenging waste at minimal rates, while wealthier, more urban, countries generate revenue by selling their disproportionately high amounts of inorganic waste. Solid waste is the most visible and pernicious by-product of a wealthier, urban, resource-intensive, consumer-based lifestyle. Greenhouse gas emissions, water pollution and endocrine disruptors are additional by-products of more urban lifestyles. Cities, in developing countries, who already cope with burgeoning populations, scarce financial resources, and a limited capacity to manage environmental issues, are facing a sharp rise in the amount and costs of garbage that they will be required to deal with by 2025. In low-income countries, MSW is often the largest single budget item for cities, and one of the largest employers. This makes waste management the most important service a city can provide. A city that cannot effectively manage its waste is rarely able to manage more complex services such as health, education, or transportation. China surpassed the United States in 2004 for the world's most municipal solid waste growth. This corresponds to their increasing urbanization and GDP which in turn generates waste increases and change; the increased consumption of plastics, paper, glass, and aluminium increases while the organics fraction decreases.

1.2 Waste produce in India:

As prosperity grows, 62 million tonnes of garbage is generated everyday by the 377 million people living in urban India, now the world's third-largest garbage generator. However, it's not the amount of waste generated that's as much of an issue as the fact that more than 45 million tonnes, or 3 million trucks worth, of garbage is untreated and disposed of by municipal authorities everyday in an unhygienic manner leading to health issues and environmental degradation. These 3 million trucks, if laid end to end, would cover half the distance between the earth and the moon. Or to put it another way, that's the distance you would cover if you made 15 trips between Mumbai and Los Angeles. With rapid urbanisation, industrialisation and an explosion in population in India, solid waste management will be a key challenge for state governments and local municipal bodies in the 21st century. "Large metropolis such as Mumbai and Delhi generate around 9,000 metric tonnes and 8,300 metric tonnes

of waste per day, respectively. India suffers from inefficient and insufficient waste infrastructure and also from increasing rates of solid waste generation per capita. Issues of service quality and waste quantity need to be handled together. Besides, the infrastructure and technologies, we must also concede that we have not addressed the issue from a systemic perspective," said Chowdary, inaugurating an Assocham Conference on 5th national conference and awards on waste to wealth.

1.3 Impact of Population Growth on Municipal Solid Waste (MSW) Generation

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 are currently generating 47.3 million tons, a 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).

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

Table 1, Population Growth and Impact on Overall Urban Waste Generation and Future Predictions until 2041:

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. Farther the landfill gets from the Point of waste generation (city), greater will be the waste transportation cost. The solution to reducing these costs and alternatives to landfilling are discussed in detail in further sections.

Years	Area of Land Occupied/Required for MSW Disposal (sq.km)	City Equivalents
1947– 2001	240	50% of Mumbai
1947- 2011	380	90% of Chennai
1947- 2021	590	Hyderabad
2009– 2047	1400	Hyderabad + Mumbai + Chennai

Table2, Area of Land Occupied/Required for unsanitary disposal of municipal solid waste (MSW) generated in India:

A 1998 study by TERI (The Energy Resources Institute, earlier Tata Energy Research Institute) titled 'Solid Waste Management in India: options and opportunities' calculated the amount of land that was occupied by waste disposed post independence, until 1997. The study compared the land occupied in multiples of the size of a football field and arrived at 71,000 football fields of solid waste, stacked 9 meters high. Based on a business as usual (BAU) scenario of 91% landfilling, the study estimates that the waste generated by 2001 would have occupied 240 sq.km or an area half the size of Mumbai; waste generated by 2011 would have occupied 380 sq.km or about 220,000 football fields or 90% of Chennai, the fourth biggest Indian city area-wise; waste generated by 2021 would need 590 sq.km which is greater than the area of Hyderabad (583 sq.km), the largest Indian city, area-wise. The Position Paper on The Solid Waste Management Sector in India, published by Ministry of Finance in 2009, estimates a requirement of more than 1400 sq.km of land for solid waste disposal by the end of 2047 if MSW is not properly handled and is equal to the area of Hyderabad, Mumbai and Chennai together.

II. MATERIALS AND METHODS

So to tackle these problems arises due to poor waste management and maintenance system, we had developed entirely new system. Waste management system comprises of following four elements:

1. E-bucket
2. Android application
3. Web portal
4. Feedback system

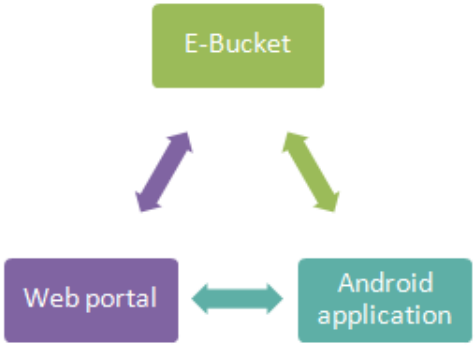


Fig 1: Schematic diagram showing relationship of various components of advance waste management system.

2.1 E-bucket (Dustbin)



Fig 2: E-bucket

E-bucket comprises of following parts

- Body of E-bucket:
- Module:
- Sensors:
- LED display:
- Control panel:
- Solar panel
- Battery:

2.2 Web page (http:ebucket.tk)

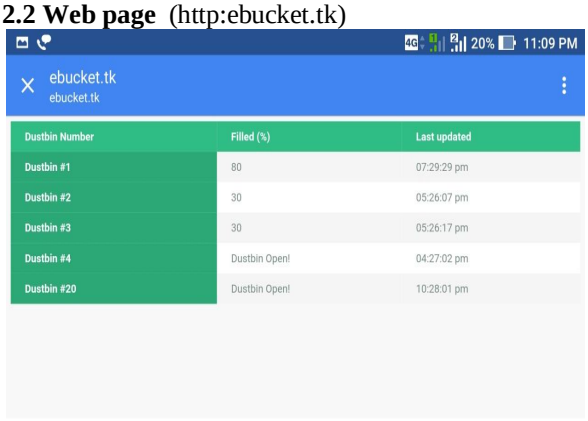


Fig 3: Layout of web page

Bucket number 1) 2)	Filled (%)	Last update (Time, Date)

1. Web page address is http:ebucket.tk.
2. Web page get update as the E-bucket sends the data when connected to internet.
3. Web page shows the bucket number, percentage of waste filled in bucket, time and date.
4. It's a part of centralized control system, single man can see and operate the entire data regarding the e-bucket at single place, reducing the efforts and cost for waste management and control.
5. Since web page shows the time to time data of waste in dustbin it's become waste management system becomes easy and cheap.
6. Data on this site can be seen on android app (E-bucket) available on play store at free of cost.

2.3 Android Application (e-bucket)

1. Name of application: E-bucket.
2. Available on android play store free of cost.
3. Idea behind developing this application is just to make easy and convenient to people for finding the e-bucket in their nearby area.
4. Main function of this app to show location of e-bucket and data of web portal.
5. E-bucket app shows location of e-bucket fitted in society and with help of Global Positioning system takes the person to nearest e-bucket. This reduces the difficulty for finding the dustbin.
6. Man can easy download this app and search the dustbin in nearby area. App is easy to operate and has low size which just consumes 2 mb in memory. Since it is available free of cost so anyone can download this application and search dustbin and amount of waste filled in it.
7. When new e-buckets are added in society their location can easily update in application by just taking the co-ordinates and filling this data to app, this will add new e-bucket in application.

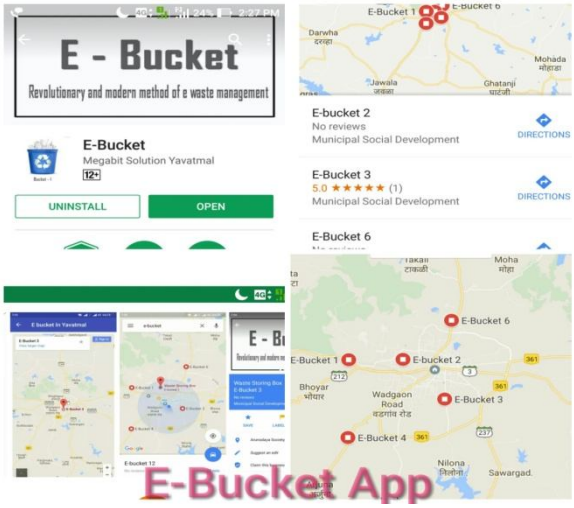


Fig 4: Layout of android application

2.4 Feedback system

1. In case when a person goes to put the waste and system is full then feedback program works.
2. Its shows the massage of Dustbin full on LED display of e-bucket.
3. Application and web portal gets information from e-bucket and feedback on application and web portal display, so person gets next duration to put the waste.
4. Centralized control system gives the duration of clearing waste from this e-bucket; this massage will get display on L.E.D. display, web portal, application.
5. Feedback system saves the time and waste accumulation.

CONCLUSION

From the study made, installation of advance waste management system will save 25-30% labour cost and with the indication to higher authority system it will also save 30% transportation cost since no need to send the vehicles to empty or half filled dustbins. The android application made easy to find location of Bucket and the photovoltaic cell will leads to Self Electricity generation and surplus electricity can be made to other purpose. This system has a major

advantage of centralized administration control and sends accurate data to administration second wise. All the waste collected by this system can be sending for recycling.

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