International Journal on Emerging Technologies **8**(1): 261-264(2017)

ISSN No. (Print) : 0975-8364
ISSN No. (Online) : 2249-3255

Khsustainable Development and Waste Management In Megacities

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(Received 25 December, 2016 accepted 22 January, 2017)
(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: the purpose of this paper is to discuss challenges faced by growing megacities of developing countries and to elaborate major challenges for sustainable waste management. Megacities deal with major environmental challenges and very high rate of illness and injury. Waste management role is growing day by day in short as well as long term. Waste problem is of great challenge in public authorities as well as in small and large scale industries. This paper deals with the effect on waste management due to rapid growth, urbanization, poverty, role of government and public authorities etc. Special attention is given to informal sectors and integration of waste management activities. Creation of sustainable management is shown by globalization and waste management.

I. INTRODUCTION

Century of radical changes is the present one and economic and global power is shifting to Asia population would show an erratic growth change of around 50% by 2050. Major changes are to be in developing countries. GDP also shows high change in current century. It is also characterized as an urban century, which is first in human era. Major population is getting concentrates in urban areas of the country. By the official report of 2007 about 3.2 billion population live in cities. By the year 2030-40 expected increase in population would reach to 3 billion of which around 65% would live in metropolitan areas. By 2050 almost two-third of the population would live in cities increasing stress in resources, infrastructure development, and waste management leading to urban poverty.

Urbanization has the product called megacities. Megacity is the metro city having population more than 10 million. High growth of development is encountered in mega-cities with the increase in formal and informal sector, crime, poverty etc. Megacity could me two metro areas or convergence of metro areas. The number of mega-cities is increasing with high rate by 2015, 33 mega cities are there, of which around 28 are in developing countries, just one-third are not in South-East Asia. In 2004, 290 million people were living in megacities of which 212 million in developing countries and about 175 million in Asian continent.Population residing in these cities is to be increased by 290,000 people per day. In 2015 total population living in megacity is to be around 360.

million and future growth rate will be like the growth rate of Delhi. Population of Delhi almost becomes three times between the years 1975-2003 according to UN estimationconcerned with the mega-cities.

Bombay, Mexico city, Delhi, Tokyo, São Paulo will be biggest megacities with 20 million people. Although megacities occupy only 2% of the total land but are responsible for the major environment degradation.

Megacities face high rate of environment problems and health hazards therefore it is important for proper waste management practices to be performed and concerning measures for effective waste disposal. For waste management it is highly recommended to understand mega-cities and factors which highly effect environment and are of great concern to human health.

II. WASTE MANAGEMENT AND UNDERSTANDINGMEGACITIES

Mega-cities can be divided into three types- emerging, transitional and mature cities depending on economic and social factors. Different characteristics effect waste management like Dynamics and growth, poverty and slums, governance and institutional problem, globalization etc. Mega-cities has high rate growth like Bangkok increased its area from 67 km^2 in 1950_s to 426 km^2 in 1990_s and Beijing has almost tripled it from the original size in last four decades. 30% of the urban population contributes about 60% of the GDP. Johannesburg is not only center of economics for South Africa but also contribute about 10% of the GDP of all African Continent. Most rapid growthis taking place in weakest regions around the world. With increasing rate of growth waste quantity is increasing at high rate with continuous increase in different types of waste product causing high risk of health. It has been estimated that quantity of urban food would increase by 44% from 2005-2025 due to which Asia will experience large amount of food waste production of 217-416 million tons a year.

Table 1: Difference between Emerging – Transition Megacities and Mature in regard with waste management.

Characteristics	Emerging – Transitional Megacities	Mature Megacities
Growth	Faster economic and population growth Younger populations Spatial growth cannot be predicted Waste quantities will increase for many Years More organic fraction is expected Land is almost not available	Stabilized economic and limited population growth Aged populations Decline of traditional city centers Suburban spatial growth Waste quantities might be reduced Land has been occupied by current infrastructure
Poverty	Extended slams Restricted access to big areas Collection coverage between 10-70% Informal sector involved in waste management Health risks are still serious	Slams are more controlled and limited Waste management is organized and delivered in certain patterns Collection coverage goes up to 100% Environmental protection and aesthetics are important
Governance	Lack of information for planning – almost impossible to get it Multiple authorities with similar responsibilities Infrastructure delivery and increasing capacity is a key-issue Financial cost will be substantially increased as waste management services will be better	There are plans in place Waste management authorities with more clear responsibilities and limited overlaps Infrastructure maintenance and up gradation is an important-issue Financial cost is very high and efforts are required to lower it
Globalization	Global nodes Global Risk areas Waste trafficking problems	Global nodes Recyclables exported to emerging – transitional megacities

A. Informal Sector Role

Informal sector plays a major role in collection and recycling of garbage collected. In Asia about 2% of population is connected with waste management activities. Informal sector is very important for recycling and re-useof the material in the usable form which support millions of people and also lower burden on resources. Informal activities are completely under private authorities so they reduce load on solid waste authorities and reduce cost of handling and disposal. So informal sector is a source of livelihood of many people and provide them with minimum cost of living. In some cases informal sector collects some fee for recyclables but main income is related with the recyclables they collect. Public and formal authorities considers informal sector to be backward and not compatible with modern management system but informal sector plays a major role in waste recovery. Cairo has a story in which modern management system was a failure as they under- estimated the role of informal sector in waste management. In this case it was said that"Waste management conventional system are in roots of reality and are very difficult to change by the officials". It is socially embedded and difficult for engineer to understand. Informal sector shows high recycle rate and has more employment than official system in use. So, it should be asked to the system, how these people could be given right place with more efficient system which could serve with economy and environment of poor? Major challenge is to change the attitude and policies concerning to informal sector. It has been seen that convergence of informal and formal sector could give large benefit and is necessary for the function of efficient system. If new system is incorporated leaving old system behind without taking its help, it would be expensive and very less effective. It is not easy task but since no alternative is possible it should be followed.

B. Technology and system applied

Conventional technology is not working in emerging and transitional mega-cities because they are centralized and are suitable for different conditions therefore decentralized system should be examined.

Conventional system is promoted by international system as to export western technology which has usual way of providing standards for funding. Another approach is using change ring model. In this approach GDP/capita is an important variable for SWM changes and therefore different ways of SWM can be performed at different stages. In other words technology to be used has GDP growth as variable but framed by the ring of history. Policy and know how.

Table 2: The Failure Receipt Components categorized in practical aspects of waste management.

Aspects	Do not (Failure components)
Planning	Copy the Master Plans with solutions from the other cities
	Design for the radical transformation but for realistic improvement.
	Provide too many priority
	Wait for the complete set of data
	Ignore and underestimate the roles of informal sectors
	Give priorities to central facility only
	Ignore the solutions required to where health risks are serious
	Forget the needs to control the waste generated as soon as possible
	Make plans without participation and interaction with all stakeholders
	Forget that the sustainable solutions are based on capacity building of the involved authorities
	Forget that Master Plans are getting old before they are completed if the growth is very fast
Financing	Wait for the financer
	Spend financer funds without creating the right framework to utilize them
	Examine only the direct costs – check also, operational and hidden cost of the proposal
	Charge equal tariffs
	Spend for new infrastructure and not for small one.
	Ignoring the cheap solution provided by the informal sector
	Ignoring the dynamics and the structure of informal market
	Ignoring the dynamics and the structure of local waste management markets
Institutions	Let responsibility overlap between lot of different authority
	Ignoring the need for coordination
	Ignoring the importance of community participations
	Waiting for new regulation to resolve the problem
	Copying regulation from other countries without considering their practical application
	Creating bureaucratic system that is inflexible to react
Collection	Import of vehicle and equipmentwithout examining how and where they could be used
	Providing same solution to different patches in the city
	Ignoring local private sectors and practical solutions that work
	Ignoring the contributions by informal sector in certain patches
Recycling	Creating formal systems which are in direct competition with informal system
	Forgetting that “recycling for living” is far more effective than “recycling for planet”
	Ignoring the organic fractionsrecycling and recover procedure
Treatment and disposal	Waiting to occupy land required
	Putting all effort to make central facility
	Designing just one and that is final destination for all waste
	Import technology because they are subsidized
	Tender without realizing informal sectors reaction
	Tender pharaonic contracts i.e. “one in all”
	Underestimating the importance of gradual improvement in landfill
	Underestimating the benefit of low cost technology

"Time usage in accessing GDP growth should be lowered and good policy should be implemented in ring system". Negative experience which is experienced in the past should be analyzed and considered while making new ideas and innovations.

Avoiding failure receipt does not necessarily mean that all the errors are eliminated but large errors can be overcome.

III. CONCLUSION

Mega-cities are very much complex and their waste management is not simple task. In fact waste management system will always be under performing due to high growth and development rate of these cities. Since these developments cannot be modeled any plan of SWM will be temporary. Certain patterns are to be made which could reflect rapid changes and waste managers could identify management system to be performed. It cannot be assumed that formation of mega-cities is automatically bad for environment but the system is to be performed where resources are utilized in sustainable manner in these rapid growing areas. Earth, Environment, Medical scientist could research in mega-cities and could identify root cause of the problem and can find solution to the problem. Research in megacities can provide global justice and peace

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