Analysis of Awareness & Attitude of Residents Towards Household Waste Management

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Abstract: Today, environmental protection has become one of the most important global issues. One such burning problem in the field of environmental protection is the issue of solid waste management, and the less explored area in this is management of household waste. People around the globe are aware that the disposal of waste in an unplanned, unorganised and in random manner is harmful for the environment. But it would be surprising to know that the awareness levels of the general public and society at large – the main generators of the household waste – are very low. In order to achieve the objectives of the Swacchh Bharat programme launched by the Honourable Prime Minister of India, the emphasis on the proper Household Waste Management has become essential. In wake of this necessity, it becomes very important to understand the current trends in the waste management and the bottlenecks in the present system. A preliminary study shows that lack of awareness, access to the recycling techniques and availability of proper disposal systems are the major hurdles in the way of Waste Management. This research aims at analysing the present awareness levels of different sections of society towards minimising generation, its willingness to participate in the process of household waste management and the general attitude of the public towards the process. Data has been obtained from different stakeholders involved in the chain. The data, so obtained from different age groups across different communities, viz. rural, urban and slums has been separately analysed using suitable statistical tools. Based on the results obtained, a general solution action plan for the problem has been arrived at for individuals with some focus on the scope of development opportunities in ensuring proper household waste management.

Keywords: Household Waste Management, Awareness, Attitude, Willingness, Swachh Bharat Mission

INTRODUCTION

Waste Management is undoubtedly one of the most crucial problems confronting entire world today. As per the recent report from various government sources, India alone generates around 150 Million Tonnes

of waste daily. Out of this, 90% of waste is disposed-off randomly along streets, water beds, rivers and open spaces. The most ignored aspect of this waste is the municipal waste and household waste, which is a significant percentage of the total waste. Where only a negligible portion of the waste is properly collected as per procedures and existing systems, still too less is the quantity which is properly disposed-off or recycled. The reasons for non-functioning of the entire system may be attributed to a plethora of reasons like shortage of space for land-fill and dumping, improper segregation of waste, high percentage of non-bio-degradable material, absence of strict regulations and laws, shortage of land for composting, inefficiency of the supply chain, non-upgradation of technology, huge capital investments, etc. to quote a few reasons. While all these issues are quite multi-dimensional in nature and require lot of strategies to resolve, single most influential factor that can change the face of the entire process tends to be ignored quite often – the "Human Factor". No scheme, no idea or no strategy can function optimally and give desired results without the appropriate involvement of the human factor, i.e., the common public.

It has been a matter of common observation that not many people feel responsible for the waste management and for the minimisation of the waste. The direct stakeholders and participants in the waste management supply chain – the rag pickers, the scavengers and the maids are looked upon as low dignity people and are not given due respect. Even the Honourable Prime Minister's initiatives like Swacchh Bharat Mission, though acted as a trigger, do not seem to have worked in the way desired. People's participation at large is the only way the target of Clean India and Waste-free India can be achieved by 2022.

This necessitates the need to explore and assess the current situation of the human factor with regards to the awareness of the public about the importance of the household waste management and their willingness and attitude in realising their responsibility participating in the waste management processes. By assessing the current scenario, relevant action plans can be prepared and implemented for educating the public and motivating them to participate actively in making India a 'Clean India' and build a healthy environment to live in.

Objectives

1. To study awareness levels of selected sections of society towards household waste.
2. To analyse willingness of people to participate in the existing waste management process.
3. To determine the influence of willingness and awareness on attitude of people towards household waste.

Limitations of the Study

1. The scope of the study has been limited to the household waste.
2. The study has been limited to households of Khadki area in the city of Pune.

REVIEW OF LITERATURE

Attitude and Awareness towards Household Waste Management

Licy *et al* in 2013, in the study on 300 randomly selected secondary and higher secondary schools in Kerala have found that the awareness levels of the secondary students towards Waste Management is higher in the

students of secondary school than that in Higher Secondary School and that giving social duty awareness along with waste management awareness may improve the practice of waste management among school students. Adding to this, in the study by **Adogu**, in 2015 on the residents of Owerri city of Nigeria using the secondary data, he has found that the citizens of Owerri City were pro-active and are well aware of the Waste Management practices, but they lack awareness on the concept of recycling techniques. Similarly, **Wakankar,** in 2016, through survey on 50 respondents across different income groups and ages of Pune city had established that around 74% of the respondents know the principle of Waste Management while 100% support the idea of Waste Management. Findings also suggest around 80% opine that commercial services should be involved to manage waste. **Massawe,** *et al*, in 2014, through questionnaire on 187 voluntary participants in HHW recycling programme at Hammond city in Lousiana has asserted that even though the awareness levels in the public of the city was good, the quantity of household waste is increasing year-on-year. Similarly, **Curtis, J.** *et al*, in 2011, by randomly questioning 300 households in the cities of Ireland, found that all the focus is on Municipal authorities towards household waste management but the main generator of wastes – the citizens, are not motivated to come forward to reduce waste, unless incentivised.

Thus, through study of different research papers, it may conveniently be asserted that the general public are aware about the waste management and problems associated with its mismanagement, but the attitude and willingness towards the household waste management is not encouraging.

## Present Status of Municipal Waste Management and its Effectiveness

Kumar and Chakrabarti (2008), in their study on the status of municipal solid waste management in metro cities and class I class II cities and towns of India, have observed that the condition of waste management is more pathetic in the metropolitan cities due to the lack of proper sanitation and locations, and regulations thereof. They found that there is a very high correlation between quantity and composition with respect to standard of living. Whereas, the practices of waste management in rural areas and Class II and Class III cities suffers due to lack of awareness and facilities for waste disposal and recycling methods. **Nawofe, Patrick, Akata** (2015) in Abakaliki Metropolis, Ebonyi State, Nigeria interviewed 100 random people about criticality of municipal solid waste management, and found that agencies do not do their work on regular basis, rapid urbanisation in state, unplanned settlements of housing and lack of sustainable waste management resulted in worsening the problem of waste management. The direct relation between environmental degradation and waste generated due to lack of waste management and recycling processes has been discussed and highlighted. **Lin, Zheng and Kirakozian** (2016), have discussed the economics of Waste Management and the effect of incentivising waste management practices. They further analysed how the factors like Marginal Benefit of reuse (MB), Marginal cost of individual sorting (MC_i), cost of ex post sorting (MC) may be used to decide the right framework to be adopted for the waste management in different scenarios. Further, **Khan and Ansari** (2010), through their analysis of theoretical framework based on the secondary data obtained from Municipal authorities and Ministry of Urban Development, GoI, 2000 on the Waste Management status in Aligarh City, have asserted that while different techniques are being deployed selectively in different categories of waste, there are no scientific and engineering methods for the treatment of municipal solid waste, also the recycling is being done but in an informal way. Thus, they emphasise on the need for formalisation of the regulatory framework for the Waste Management

methods. **Adogu** (2015), through analysis of secondary data obtained from the Government and the Municipal authorities of Owerri City, Nigeria, has found that though the residents of the city are pro-active towards Waste Management, the lack of proper regulatory framework is impacting the process.

Importance of Educational Campaign

Grodzi´nska *et al* (2004) had conducted a survey on the 60 individuals of local schools of Jaslo, Poland, wherein they found that conducting educational campaigns resulted in an increase in recycled wastes collected form the residents. Whereas, **Licy** *et al* (2003)*,* have observed that giving social duty awareness along with waste management awareness improves the practice of waste management. Adding to this, **Kumar** (2011), in his research paper on composting as an effective method of Waste Management, stressed that there is lack of awareness of the techniques to undertake large scale composting as an effective measure of household organic waste management, and suggests that effective educational campaigns by the government and the authorities shall encourage the public to adopt wide-spread usage of composting techniques and shall help in solving problem of organic waste management. They also suggest that selective waste collection has a positive impact on the overall waste management. **Z Wang** *et al*, (2011) found that the citizens in Beijing, China have lower level of willingness to participate in e-waste recycling. Residents usually look personal benefits in disposing off e-waste. Most of them agrees that stern law and regulations are needed to be implemented that will make changes in attitude of people. Also, depending on the house size people are willing to participate in recycling of e-waste and more emphasis on educational campaign and government policies are needed.

MODEL OF THE STUDY
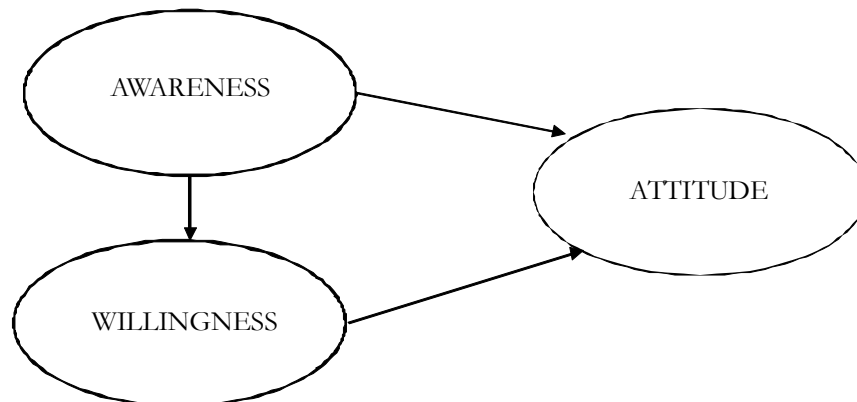
RESEARCH METHODOLOGY

The present topic was selected to understand the awareness levels, attitude and willingness of general public towards the house hold waste management processes. A questionnaire consisting of 6 general questions and 16 specific questions aimed at obtaining a comprehensive indication of the awareness, willingness and attitude levels of the public was drafted and pilot study was conducted on 10 maids and worker class. The responses were checked for consistency using Cronbach's test, wherein the alpha value of 7.18 was obtained, which showed good consistency of the questionnaire. A sample size of 120 was

selected for the study through stratified random sampling, and accordingly, responses were collected from 123 respondents who are residents of Khadki in Pune across different localities – Government colony, apartment flat, rural household / slums, independent house, etc. across different age groups, educational back grounds and occupations. The questionnaire and the research was based on the following three hypotheses:

Hypothesis – 1

H_1: Awareness about household waste management and willingness of public for participation in waste management process have a positive relationship.

H_0: Awareness about household waste management does not have any relationship with willingness of public in waste management process.

Hypothesis – 2

H_1: There is a positive relationship between willingness to take part in waste management process and positive attitude towards waste management.

H_0: There is no relationship between willingness to take part in waste management process and positive attitude towards waste management.

Hypothesis – 3

H_1: There is a positive relationship between awareness about waste management and positive attitude towards waste management.

H_0: There is no relationship between awareness about waste management and positive attitude towards waste management

The responses, so obtained, were properly categorised, tabulated and analysed using appropriate descriptive statistical tools and correlation and hypotheses testing using p-values obtained from 'R' software.

RESULTS AND ANALYSIS

The Part-A and Part-B of the questionnaire constituted the general information (demographic profile) and the particular information respectively. Part-B of the questionnaire was further subdivided for analysis purpose into three groups signifying different indices representing awareness, willingness and attitude of public towards household waste management. The responses were sought on a Likert Scale of 1 to 7 with 1 indicating 'Strongly Disagree' and 7 indicating 'Strongly agree'. The sub-classification of questionnaire is as shown in Table 1:

Table 1
Sub-classification of questionnaire

SNo.	Question Numbers	Indication
1	Question – 1 to Question – 6	Awareness Index
2	Question – 7 to Question – 11	Willingness Index
3	Question – 12 to Question – 16	Attitude Index

The analysis shall be discussed under the following heads:

a) **Awareness Index:**

Questions 1 to 6 help us analyse the awareness of the respondents about the need for waste management and available techniques and platforms thereof for mass participation. The consolidation of these responses represents the **Awareness Index of the Population**.

The overall Awareness Quotient is obtained by obtaining the Mean of Means of the responses. The Overall Awareness Quotient thus comes to 6.15. This shows that the respondents are aware of household waste management techniques and the need for proper management and disposal of household waste.

b) **Willingness Index**

Questions 7 to 11 helped to analyse the willingness of the respondents towards their participation in Waste Management process. The consolidation of these responses represents the **Willingness Index of the Population**.

The overall Willingness Quotient is obtained by obtaining the Mean of Means of the responses for Questions 7 to 11. The Overall Willingness Quotient comes to 4.65. This shows that the respondents are 'just' scarcely willing to take an active participation in minimising, cleaning and management of household waste.

c) **Attitude Index**

Questions 12 to 16 helped to analyse the attitude of the respondents towards their participation in Waste Management process. The consolidation of these responses represents the **Attitude Index of the Population**.

The overall Attitude Quotient is obtained by obtaining the Mean of Means of the responses for Questions 12 to 16. The Overall Attitude Quotient, thus comes to 4.69. This shows that the attitude of the respondents, though on the positive side of the scale, the overall attitude is 'just' positive. There is a high requirement of more positivity in the public to motivate them and improve their attitude.

The entire data which has been classified in terms of three indices – Awareness Index, Willingness Index and Attitude Index has been obtained by consolidating and computing the mean distribution of responses of respective questionnaire.

Figure 1 represents the mean values of awareness index, willingness index and attitude index calculated through weighted averaging method. The mean values, thus obtained, have been referred to as Awareness Quotient, Willingness Quotient and Attitude Quotient respectively.

In addition to these, the relationship between different demographic parameters and the three indices has also been summarised and analysed. The subject matter of interest is to know the relation between the type of locality and the indices, which is shown in Figure 2.
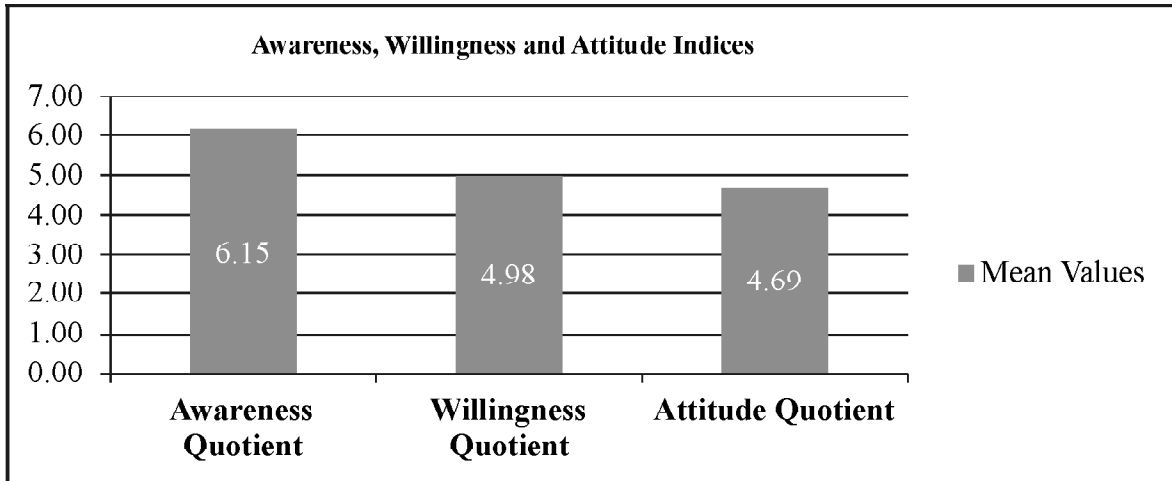
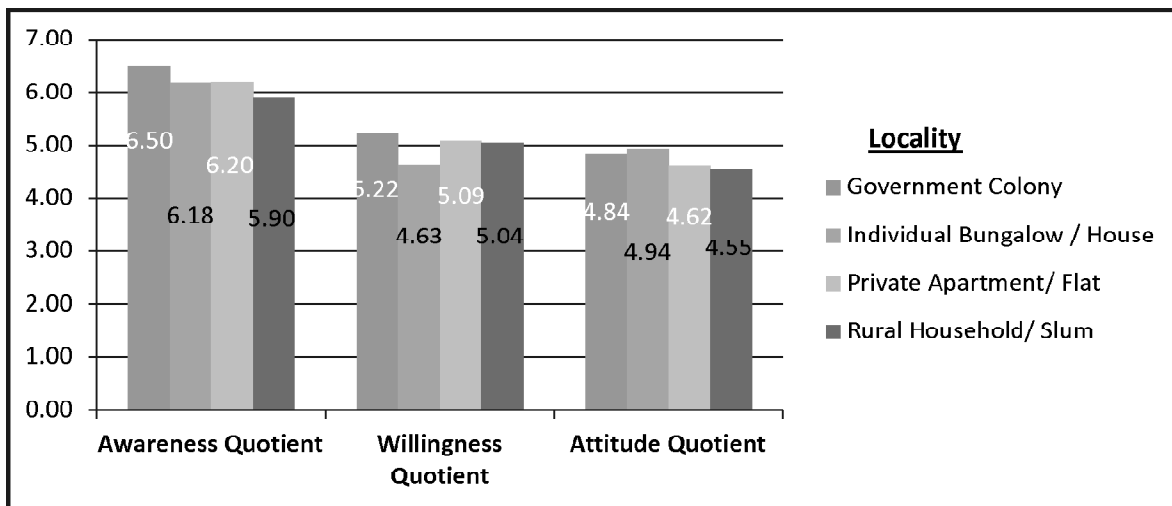**Figure 1: Comparison of Awareness, Willingness and Attitude Indices**

Figure 2: Relation Between Locality and Different Indices

Relation Between Different Indices – Correlation Analysis

The interrelation and interdependence between the awareness, willingness and attitude towards household waste management has been found by finding the correlation between the variables of the respective indices. The values of the Karl Pearson's correlation coefficients for the collected data for relevant questions, as calculated using 'R' are shown in Table 2.

Relation between Awareness and Willingness

The relation between awareness and willingness can be obtained by finding the correlation co-efficient between the responses of related questions. The Karl Pearson's correlation co-efficient for the responses been obtained using 'R', is r = 0.11.

Table 2
Karl Pearson's Correlation Coefficients

SNo	Variable – 1	Variable – 2	Karl Pearson's Correlation coefficient	Inference
1	Awareness about household waste management	Willingness for participation in household waste management process	0.11	No correlation
2	Willingness for participation in household waste management process	Positive attitude towards household waste management practices	0.34	Very Weak correlation
3	Awareness about household waste management	Positive attitude towards household waste management practices	0.43	Weak correlation

This shows that the two variables – awareness and willingness are not correlated.

Relation between Willingness and Attitude

The relation between willingness and attitude can be obtained by finding the correlation co-efficient between the responses of related questions The Karl Pearson's correlation co-efficient for the responses been obtained using 'R', is r = 0.34.

This shows that the two variables – willingness and attitude are very weakly correlated.

Relation between Awareness and Attitude

The relation between awareness and attitude can be obtained by finding the correlation co-efficient between the responses of related questions. The Karl Pearson's correlation co-efficient for the responses been obtained using 'R', is r = 0.43.

This shows that the two variables – awareness and attitude are weakly correlated.

Hypothesis Testing

The hypothesis testing has been done to check the degree of association between the variables at 5% level of significance. The p-values, as obtained from 'R' are as summarised in Table 3.

Table 3
p-Values for Hypotheses Testing

SNo	Hypothesis	Independent Variable	Dependent Variable	p-value	Inference
1	Hypothesis – 1	Awareness about household waste management	Willingness for participation in household waste management process	0.2233	Null hypothesis cannot be rejected
2	Hypothesis – 2	Willingness for participation in household waste management process	Positive attitude towards household waste management practices	0.0001	Null hypothesis rejected
3	Hypothesis – 3	Awareness about household waste management	Positive attitude towards household waste management practices	0.00000797	Null hypothesis rejected

Hypothesis – 1: From Table 3, it can be seen that the awareness and willingness towards household waste management process are very weakly correlated. Also, from Table 3, the p-value for the variables is 0.2233, which is greater than 5% level of significance. Hence, we **fail to reject the null hypothesis** that 'Awareness about household waste management does not hold any relationship with willingness of public in waste management process.'

Hypothesis – 2: From Table 3, it can be seen that the willingness and attitude towards household waste management process are weakly, but positively correlated. But, from Table 3, the p-value comes out to be 0.0001, which is less than the 5% level of significance. Therefore, we **reject the null hypothesis** of hypothesis – 2, therefore, the **alternate hypothesis** which states that 'There is a positive relationship between willingness to take part in waste management process and positive attitude towards waste management' is **accepted**.

Hypothesis – 3: From Table 3, it can be seen that the awareness and attitude towards household waste management process are moderately and positively correlated. Also, from Table 3, the p-value for the variables is 0.00000797, which is negligible compared to the level of significance 5% set for our study. Thus the **null hypothesis** stands **rejected** and the **alternate hypothesis** which states that, 'There is a positive relationship between awareness about waste management and positive attitude towards waste management' is **accepted**.

The results can be diagrmatically represented by the model as follows:
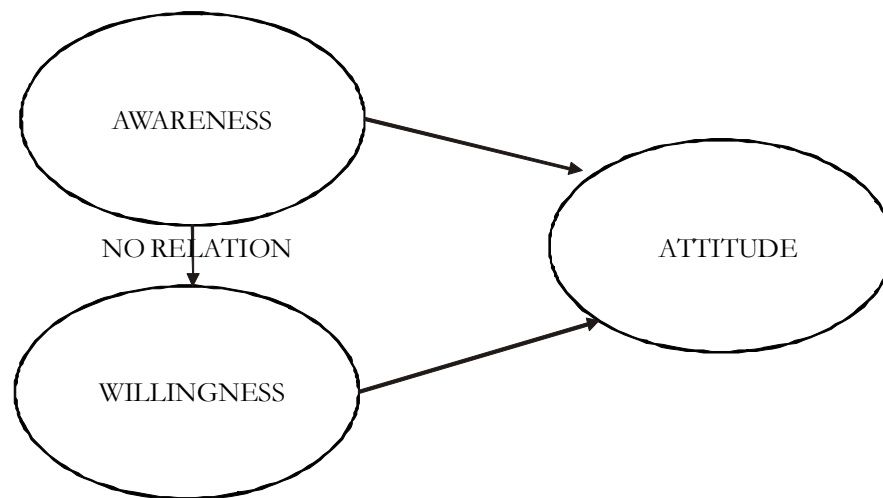
CONCLUSIONS AND RECOMMENDATIONS

The analysis of the data collected and the results, thus obtained, have been summarised as discussed in the above sections. In addition to those, the research also throws light on some other interesting facts.

It has been observed that all the three indices – awareness, willingness and attitude are consistently low in the rural households and slums. This shows the lack of willingness and attitude of the rural and slum public towards management of household waste, which highlights an alarming case of pronounced problem with the fact that majority of the nation dwells in rural and slum areas.

Majority of the public across all localities and households is aware of the waste management principle, recycling, segregation of waste into wet and dry, composting, hazards of plastic, methods of disposal like incineration, landfill, etc. Prime Minister's Swacchh Bharat Mission has also played a very important role in spreading awareness about waste management. Almost every individual irrespective of the age, educational qualification or occupation, is conscious of the waste generation and knows quite well the importance of waste minimisation. It was evident, through the responses obtained from open-ended questions, that the awareness of the public has increased over the previous year, especially with the Municipal authorities and other Government officials involved better than before. The construction of public toilets, system for collection of waste every alternate day through manually operated puck-up type rickshaws, vans, etc. and regular disposal have helped the waste management process to a great extent.

While it is quite heartening that the awareness levels of the public about waste management practices is remarkable, on the other hand, it is disheartening to learn that when it comes to participation of public in the waste management process, people still lack positive attitude. A significant proportion still feels that Waste Management is mostly the responsibility of the Municipal Authorities and despite of the pre-requisite knowledge, many feel that they do not have much role to play in the process. People feel that the present waste management system is barely sufficient and there is requirement of lot of improvement in the process. While it may very conveniently be argued that there is a lot of scope for improvement in the process, it must not be forgotten that it is the people who make any scheme or any process successful.

Recommendations

The significant learning has been that awareness does not hold correlation with the willingness of the public to participate actively in the waste management process, nor with the attitude of public towards the same. The government and many NGOs have been trying continuously trying to educate and make people aware of the ill effects of the improper disposal and littering of waste. But the irony is that the people are quite aware, but they lack proper attitude which would boost their willingness in the process. Hence, it is high time the government and other authorities focussed on motivating the public to participate in the mass cleanliness drives and encouraged them to follow discipline on daily basis. The following recommendations may help to address the issue:

1. **Incentivising participation:** In many developed countries like Sweden and Columbia, waste collection is incentivised. Waste is exchanged for some monetary compensation. Also, households which generate waste less than some specified amount are awarded some incentives. In Indonesia, people can trade trash for free health care. Implementation of such systems would motivate the public and exponentially improve the attitude of the public. It is to be noted that the incentives provided would definitely have a much lower financial impact than the opportunity cost or the cost to recycle and the cost of damage caused to the environment.

2. **Outsourcing the waste management and waste collection process:** The present supply chain of the household waste management is through Government and Municipal authorities, wherein the basic collection vehicles are mostly government-owned and the scavengers and the collectors of waste are compensated by collection from the households of the society. This results in very less meagre wages for the scavengers and their exploitation. Also, this adds to the cost of the government.

There is a lot of scope of private venturing in the household waste supply chain. Outsourcing the waste management and waste collection process through commercial private venturing shall have multi-fold advantages. This would help in reduction of costs, increase in efficiency, promptness and speed of the process. This would also provide large scale employment and increase in life standards of the uneducated and unemployed public.

3. **Stricter laws and regulations for non-compliance:** The present law for waste management is not very effective and strict enough. This provides chance for the citizens to behave the way they want. Stricter implementation of laws related to anti-littering, random disposal of waste, ban of inferior plastic bags, etc. with possible imprisonment and heavy monetary fines should be ensured. In order to achieve stricter control and direct supervision, specially incentivised whistle-blower schemes and empowered task force of Swacchh Bharat representatives constituting of unemployed youth deployed in each society would serve the purpose of forced motivation among the public.

4. **Practical education about waste management at schools and colleges:** There are thousands of schools and colleges in India, but only a handful of schools and colleges train the students on waste management. It's essential to teach our future generation about waste management so they can be pre-equipped and prepared with a new trend of minimizing and proper disposing of the waste. In every school and colleges it should be made compulsory to have a cleanliness drive and educating all students about different practices in waste management, its segregation, minimization, recycling and techniques to do proper waste management.

In addition to these, there are many new technologies and developments in the field of recycling and management of household waste throughout the world. It is high time good capital investments are made for introduction of new technologies like Artificial Intelligence, automation, and optimal utilisation of available technologies like composting, biogas generation, and waste – to – oil technology, etc. This would generate a large number of jobs and energy and help reduction in the disposable, non-recyclable waste, which would yield huge returns in the form of conservation of environment. Only through implementation of such positive measures and by motivating each individual to participate in the process can India achieve the goal of clean and self-sufficient country by 2022, as envisaged by the Honourable Prime Minister. These findings leave us with enough food – for – thought to ponder upon.

REFERENCES

Abel, A. (2007). An analysis of solid waste generation in a traditional African city: the example of Ogbomoso. *Nigeria Environ Urban.* (2007) Vol. 19, pp: 527–537. DOI: 10.1177/0956247807082834. Retrieved from www.sci-hub.org accessed in July 2017.

Abeyewickreme, W., Wickremasinghe, A.R., Karunatilake, K., Sommerfeld, J., Axel, K. (2012). Community mobilization and household level waste management for dengue vector control in Gampaha district of Sri Lanka; an intervention study. *Pathogens Global Health. (2012).* Vol. 106, pp: 479. DOI: 10.1179/2047773212Y.60. Retreived from www.sci-hub.org accessed in July 2017.

Adogu, P.O.U., Uwakwe, K.A., Egenti, N.B., Okwuoha, A.P. and Nkwocha, I.B. (2015). Assessment of Waste Management Practices among Residents of Owerri Municipal Ino State Nigeria. *Journal of Environment* (2015) 06, 446-456 (Online). Retrieved from http://file.scirp.org/Html/4-6702622_56212.htm accessed in July 2017.

Asase, M., Yanful, K.K., Mensah, M., Stanford, J. and Amponsah, S. (2009). Comparison of municipal solid waste management systems in Canada and Ghana: A case study of the cities of London, Ontario, and Kumasi, Ghana.

Waste Manag. (2009) Vol. 29, pp : 2779–2786. DOI: 10.1016/j.wasman.2009.06.019. Retrieved from www.sci-hub.org accessed in July 2017.

Curtis, J., Lyons, S. and O'Callaghan-Platt, A. (2004). Managing Household Waste in Ireland: Behavioral Parameters and Policy Options. Retrieved from https://www.esri.ie/pubs/WP295.pdf accessed in July 2017.

Fobil, J.N., Armah, N.A. and Carboo, N. (2008). The influence of institutions and organizations on urban waste collection systems: An analysis of waste collection systems in Accra, Ghana (1985-2000). *J Environ Manage.* (2008). Vol. 86, pp: 262–271. DOI: 10.1016/j.jenvman.2006.12.038. Retrieved from www.sci-hub.org accessed in July 2017

Grodzi´nska-Jurczaka, M., Tomala, P., Tarabuła-Fiertaka, M., Nieszporeka, K. and Read, A.D. (2004). Effects of an educational campaign on public environmental attitudes and behaviour in Poland. *Resources, Conservation and Recycling* 46 (2006) 182–1971. Retrieved from https://www.researchgate.net/profile/Katarzyna_Nieszporek/publication/223441237_Effects_of_an_educational_campaign_on_public_environmental_attitudes_and_behaivour_in_Poland/links/5486d63a0cf289302e2c3f22/Effects-of-an-educational-campaign-on-public-environmental-attitudes-and-behaivour-in-Poland.pdf accessed in July 2017.

Khan, Md Azam, Ansari, Iqbal Zafar (2010). Municipal Solid Waste Management in India: A Case Study of Aligarh City. *Pranjana,* Vol 13, No. 2, Jul-Dec 2010. Retrieved from https://eds.a.ebscohost.com/eds/pdfviewer/pdfviewer?vid=1&sid=360ae2c2-90f2-40bb-92ce-6eb5815b4711%40sessionmgr4008 accessed in July 2017.

Kirakozian, A. (2016). One without the Other? Behavioural and Incentive Policies for Household Waste Management. Journal of Economic Surveys, 30(3), 526-551. Retrieved from https://eds.b.ebscohost.com/eds/pdfviewer/pdfviewer?vid=1&sid=f2b7ce54-567d-4b08-b941-84af351f6c50%40sessionmgr103 obtained in July 2017.

Kumar, S., Bhattacharyya, J.K., Vaidya, A.N., Chakrabarti, T., Devotta, S. and Akolkar, A.B. (2008). Assessment of the status of municipal solid waste management in metro cities, state capitals, class I cities, and class II towns in India: An insight. *Waste Management* 29 (2009). pp. 883-895. Retrieved from https://www.researchgate.net/publication/5257036 accessed in July 2017.

Kumar, S. (2011). Composting of municipal solid waste. *Critical Reviews In Biotechnology*, *31*(2), 112-136. DOI:10.3109/07388551.2010.492207. Retrieved from http://www.tandfonline.com/doi/full/10.3109/07388551.2010.492207 accessed in July 2017.

Lee, S. and Paik, H.S. (2011). Korean household waste management and recycling behaviour. *Journal of Building and Environment* 46 (2011). ISSN (Online): 1159-1166. Retrieved from www.elsevier.com/locate/buildenv , Accessed in August, 2017

Licy, L.D., Raghavan, Vivek, Kamath, Saritha, Anies, T.K. and Josphina, C.T. (2013). Awareness, Attitude and Practice of School Students towards Household Waste Management. *Journal of Environment* (2013). Vol. 02, Issue 06, pp. 147-150. ISSN (Online): 2049-8373. Retrieved from https://www.researchgate.net/profile/Vivek_Raghavan2/publication/2695620226_Awareness_Attitude_and_Practice_of_School_Students_towards_Household_Waste_Management/links/548e6d9e0cf2d1800d8424ba/Awareness-Attitude-and-Practice-of-School-Students-towards-Household-Waste-Management.pdf accessed in July 2017.

Mamady, K. (2016). Factors Influencing Attitude, Safety Behavior, and Knowledge regarding Household Waste Management in Guinea: A Cross-Sectional Study. *Journal of Environmental and Public Health*, 20169305768. DOI:10.1155/2016/9305768. Retrieved from https://eds.b.ebscohost.com/eds/pdfviewer/pdfviewer?vid=1&sid=9d0da1a2-4187-442f-9b78-8906d932de09%40sessionmgr103 accessed in July 2017.

Massawe, E., Legleu, T., Vasut, L., Brandon, K. and Shelden, G. (2014). Voluntary approaches to solid waste management in small towns: a case study of community involvement in household hazardous waste recycling. *Journal of Environmental Health*, (10), 26. Retrieved from https://eds.b.ebscohost.com/eds/pdfviewer/pdfviewer?vid=1&sid=ced14cba-0ac0-4621-b2dd-aaf53148c76b%40sessionmgr101 accessed in July 2017.

Mosler, J.H., Drescher, S., Zurbrugg, C., Rodriguez, C.T. and Miranda, G.O. (2006). Formulating waste management strategies based on waste management practices of households in Santiago de, Cuba, Cuba. *Habitat Int.* (2006) Vol. 30, pp : 849–862. DOI: 10.1016/j.habitatint.2005.09.008. Retrieved from www.sci-hub.org accessed in July 2017.

Okazaki, W.K., Turn, S.Q., Flachsbart, F.G. (2008). Characterization of food waste generators: A Hawaii case study. *Journal of Waste Management (2008)*, Issue 28, pp: 2483-2494, Retreived from www.sciencedirect.com , accessed in August 2017.

Owusu, G., Oteng-Ababio, M. and Afutu-Kotey, R.L. (2012). Conflicts and governance of landfills in a developing country city, Accra. *Landsc Urban Plan. (2012)* Vol. 104, pp 105–113. DOI: 10.1016/j.landurbplan.2011.10.005. Retrieved from www.sci-hub.org accessed in July 2017.

Refsgaard, K., Magnussen, K. (2009). Household behaviour and attitudes with respect to recycling food waste - experiences from focus groups. *Journal of Environmental Management* (2009). Vol. 90, pp: 760-771, Retrieved from www.elsevier.com/locate/jenvman , accessed in August, 2017

Rekha, S., Patel, M.L., Nischal A. (2012). Assessment of the knowledge, attitude and Practices regarding Biomedical Waste Management amongst the Medical and Paramedical Staff in Tertiary Health Care Centre. *International Journal of Scientific and Research Publications* (July 2012), Vol. 02, Issue 07, ISSN (Online) 2250-3153. Retrieved from https://www.researchgate.net/publication/304282694, accessed in August, 2017.

Wakankar, Arpita. (2016). Analysis of Effective Management of Household Waste. Research Report submitted in Partial fulfilment for the Post Graduate Diploma in HRM at SIMS, Pune. Accessed in July 2017.

Yoada, R.M., Chirawurah, D., Adongo, P.B. (2014). Domestic waste disposal practice and perceptions of private sector waste management in urban Accra. *BMC Public Health* (2014). Volume 14, Issue 697. DOI: 10.1186/1471-2458-14-697. Retrieved from www.sci-hub.org accessed in July 2017.

Zia, H., Devadas, V. (2008). Urban solid waste management in Kanpur: opportunity and perspectives. *Habitat Int.* (2008) Vol. 32, pp. 58–73. DOI: 10.1016/ j.habitatint.2007.08.001. Retrieved from www.sci-hub.org accessed in July 2017.