The Impact of Knowledge and Attitudes of Managerial Officers on Solid Waste Management Practices in Sri Lanka

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Abstract

As in many developing countries, solid waste management (SWM) is a key issue in Sri Lanka. And the quantity and the quality of the waste generated are directly influenced by the knowledge, attitudes and practices of people. Poor community participation is one of the main barriers for finding a sustainable solution for the said problem. The main objective of this study is to investigate the impact of knowledge and attitudes on waste management practices followed by managerial officers in Sri Lanka which is considered as a significant group of the society because of their education level and direct involvement of decision making at organizational and national level. Population was selected as students who studied Master of Business Administration (MBA) of University of Sri Jayewardenepura students as they are supposed to be future leaders of the country. Hundred students who follow MBA programs were selected as the sample, representing managerial level officers in different sectors. Knowledge and attitudes were considered as independent variable and practices as the dependent variable and they were measured using few dimensions. Primary data was collected through self-administered questionnaire. The version 22.0 SPSS package was used for data analysis. According to the findings, majority of MBA students possessed moderate level of knowledge and more than 75% of respondents had favorable or most favorable attitudes on solid waste related aspects. However, 15.9% of MBA students had negative attitudes on solid waste and especially on value of waste. Regarding their practices, nearly 40% of respondents follow poor waste management practices and it reached more than 55% in waste segregation and recycling behaviors. Knowledge on solid waste didn't show a significant relationship with their practices. But a weak positive correlation was found between overall attitudes and waste management practices (r = 0.267) and a moderate positive correlation between attitudes on responsibility on public participation and practices (r = 0.539). Therefore, among MBA students, only the attitudes showed a significant positive impact towards SWM practices but not the knowledge. Hence, through building correct attitudes which need to be initiated from ground level can effectively contribute to implement sustainable waste management mechanism as attitudes of these future leaders are influential not in individual level but also in organizational and national level.

Key words: Solid waste, waste management practices, knowledge, attitudes, managerial level officers

INTRODUCTION

Urbanization is the major transformation occurred in last century and now it has become one of the direct key factors for most of the prevailing global environmental and social issues. Out of many such

issues, solid waste takes the highest priority due to its environmental, social and economic issues. Solid waste management is a challenge faced by both developed and developing countries(Mbuligwe, 2002). However, this is a more prevalent issue in developing countries with their rapidly growing cities and town developments (Jing et al., 2009 and Guerrero et al., 2013).Increasing population levels, rapid urbanization, booming economy and rise in community living standards which have significantly increased the speed of municipal solid waste generation in developing countries (Minghua et al.,2009).

Solid waste is the useless and unwanted products in the solid state arising from domestic, trade, commercial, agricultural, industrial, mining activities and from public services as well (Bhuiyan, 2010). Drastic changes occurring in human lifestyles,as a result of concentrated activities by the population, businesses, agriculture, industries, and institutions, in the recent past have caused substantial increase of solid waste generation and especially failing of implementing proper management has caused the waste as a major global issue. Waste management is an integrated system to manage the waste and this includes, waste reduction, composting, collection and transport, recycling, energy recovery, treatment and disposal (Moller and Uhre,1996) and these management systems should be economically viable, socially acceptable and environmentally effective to become sustainable (McDougall, et al.,2001).

There are many factors affecting the proper implementation of solid waste management systems which can be technical, environmental, socio-cultural, legal and institutional (Guerrero et al., 2013). According to Srivastava et al. (2015), public attitude , knowledge and practices are one of the main factors influencing urban solid waste management in the developing world. Kofoworola (2007) says that individual or group awareness and attitudes towards waste generation and management are critical in the effort to respond to waste management challenges.The study conducted for undergraduate students at Philippines State University shows that knowledge, attitude of students on solid waste have a positive effect on practicing behaviors of solid waste management and many socio-demographic factors (Barloa et al., 2016). From the studied conducted in in University of Rajasthan, Arora and Agrawal (2011) showed there is a significant association between knowledge and practices and knowledge and. Further they revealed that, students who possessed good knowledge also have a good level of practices, and they were able to manage the waste in a proper manner.In a study conducted in Lahore city Pakistan, to investigate the knowledge, perception and attitudes of common people towards solid waste management practices it had been found that, attitude and participation of the local community towards solid waste management is the key component for the successful implementation of any waste alleviation program and industrial solid waste management (Haider et al., 2015).

Being a developing country, Sri Lanka still experiences unacceptable solid waste disposable practices and this one of the biggest current environmental problems in the country. Illegal dumping is a common practice in the country with approximately 20% residents dumping their waste on road sides (Bandara, 2008) and according to Visvanathan (2006), 85% of collected waste in Sri Lanka is subjected to open dumping.The seriousness of this issue was revealed with the tragedy of collapsing Meethotamulla garbage dumpin year 2017 killing 19 people. Many studies have shown that public attitude, perception and knowledge on waste management are one of the key factors for the success of integrated waste management mechanisms in the country (Bandara, 2008; Hikkaduwa et al., 2015). As identified, one of the main barriers for implementing sustainable solid waste management practices in Sri Lanka is low community participation.

The present study was thus conducted to investigate the impact of knowledge and attitudes on waste management practices followed by managerial officers in Sri Lanka which is considered as a significant group of the society because of their education level and direct involvement of decision making at organizational and national level.This study similarly attempted to identify the level of knowledge and attitudes in solid waste management among managerial officers, identify waste management practices they apply and assess relationships between knowledge and attitudes with their practices. Since managerial officers are influential group of the country, it was expected that the findings of this study could contribute for designing and implementing appropriate effective solid waste management practices in Sri Lanka.

METHODOLOGY

Research design

In present study, knowledge and attitudes of managerial officers in Sri Lanka were used as independent variables and their waste management practices were used as the dependent variable. Through a deep literature study that had been carried out, three dimensions were selected to each variable type and indicators were chosen to measure each dimensions. Knowledge variable had three dimensions; knowledge on impacts of waste, knowledge onsegregation and knowledge on sustainable management whereas the second independent variable, attitudes also had three dimensions; attitude on responsibility of waste management, attitudes on safe disposal and attitudes on value of waste. Same as, dependent variable, waste management practices, alsohad three variables; disposal, segregation and recycling.
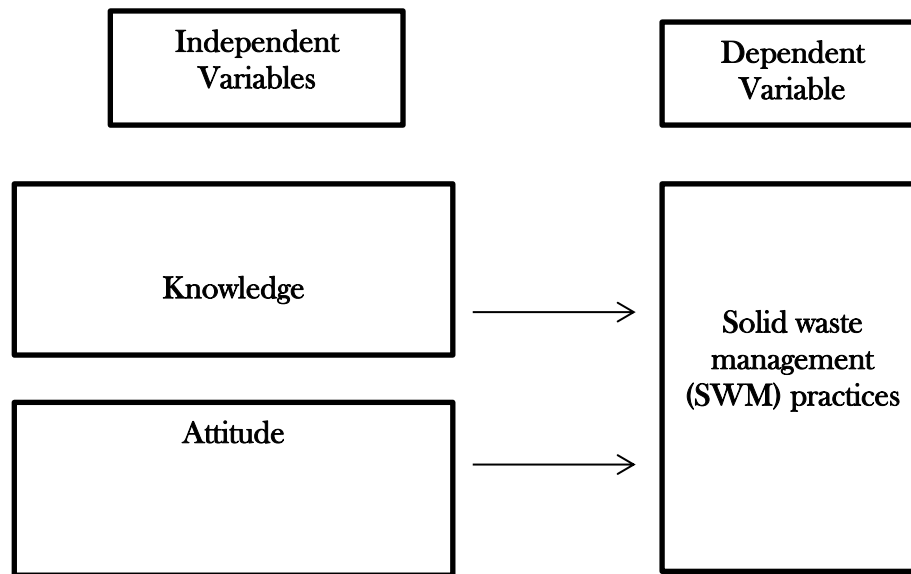
Figure 1: Conceptual framework of the study

Population

The population was taken as MBA students from University of Sri Jayewardenepura,as they are all managerial level officers and characterizes a wider cross section of managers in the country due to many reasons such as, representing both private and government sectors, belonging to different disciplines as well as different managerial levels.

Sampling method

The sample was selected from the students following the MBA degree program at the University of Sri Jayewardenepura as it is one of the leading MBA programs in the country which covers a wide range of managers representing many organizations. Accordingly hundred students were selected as the sample, representing managerial level officers in different sectors for the survey.

Instrument used

Self-administered questionnaire was used to gather information on demographic data of the sample, knowledge and attitudes on waste and current waste management practices they adopt. The questionnaire was pre-tested using 28 students to ensure feasibility, reliability and validity. Secondary data were collected through various published reports, research articles and newspaper articles etc.

Data Analysis

The Likert scale was used to measure the strength of each individual's knowledge, attitude and practices on waste management by assigning nominal values to items according to the scales. Four Likert scales of strongly agree (SA), agree (A), disagree (D), and strongly disagree (SD) were used to measure the knowledge and attitudes whereas Very Often (VO), Often (O), Not Often (NO) and Never (N) were used to measure waste management practices (Jatau, 2013). To determine the levels of knowledge, attitude and practice statistically, the scores for each dimension was partitioned. The mean value added to one standard deviation represented the upper limit while the mean value minus one standard deviation represented the lower limit. The mean values above the upper limit were considered as high, values below the lower limit were considered as low while values lying between the upper and lower limits were considered as moderate (Adeolu et al., 2014). Descriptive statistics; frequency percentages, mean and standard deviation were used to describe the studied variables. Pearson's Correlation test was used to assess the relationship between variables. Statistical analysis was carried out using SPSS 22.0 software.

RESULTS

Demographic characteristics of respondents

The questionnaire was given to randomly selected hundred MBA students and eighty two questionnaires were received, therefore, the respondence rate was 82%. The resultsanalyzed show that respondents used for this study possess the following demographic characteristics; the total number of respondents is eighty two (n=82) and the males are 53.7% and females are 46.3%. Their age ranges are, 31.7% for age 20-30 years, 50% for 31-40 years and 15% for 41-50 years. 73.2% respondents have postgraduate level qualifications and 25.6% and 1.2% have graduate and diploma level qualifications respectively. 68.8% respondents are working in the private sector, 14.6% in government or semi-government institutions, 14.6% are in international organizations and 2.4% are self-employed.

Statistical levels of Knowledge, Attitudes and Practices

According to the Table 1, majority (67.1%) have moderate level of knowledge on solid waste related aspects and 14.6% have good knowledge and 18.3% belongs to the poor knowledge category, revealing that the combined knowledge on waste related aspects of respondents is at average level. When considering each dimension measured related to knowledge on solid waste, for the knowledge on impacts of solid waste, 74.4% possess moderate knowledge, 11% have a good level of knowledge whereas, 14.6% belongs to low level (poor). In knowledge regarding waste segregation, 69.5% have

a moderate level of knowledge and 11% and 19.5% have a good level and poor level respectively. In knowledge on solid waste management practices,majority (67.1%) possesses moderate level, 18.3% are having poor knowledge and 14.6% respondents have good knowledge.

Table 1: Level of knowledge on waste (combined) and knowledge level on three different dimensions
*Values in parenthesis are percentages

	Poor	Moderate	Good
Level of combined knowledge on waste related aspects	15 (18.3)*	55 (67.1)	12 (14.6)
Level of knowledge on three different dimensions			
Knowledge on impacts of waste	12 (14.6)	61 (74.4)	9 (11.0)
Knowledge on waste segregation	16 (19.5)	57 (69.5)	9 (11.0)
Knowledge on sustainable solid waste management	12 (14.6)	55 (67.1)	15 (18.3)

The data in Table 2 shows, attitudes on waste aspects, 74.4% have moderate level or favorable attitude , 12.2% have most favorable attitudes whereas, 13.4% have less favorable attitudes. When considering level of attitudes respected to each dimension measured, responsibility for participation in waste management, 74.4% showsfavorable attitudes, 9.8% are highly favorable and 15.9% have negative attitudes. The attitudestowards waste disposal practices, 57% have favorable attitudes for good disposal practices, 13% are highly favorable and but 17% possess negative attitudes. For the attitudes for value of waste, majority (57.3%) showsfavorable attitude, 12.2% are highly favorable and 30.5% are less favorable.

Table 2: Level of attitudes on waste (combined) and attitude level on three different dimensions

	Less Favorable	Favorable	Highly Favorable
Level of attitudes (combined) on waste related aspects	11(13.4) *	61 (74.4)	10 (12.2)
Level of attitudes on three different dimensions			
Attitude on public responsibility on solid waste management	13 (15.9)	61 (74.4)	8 (9.8)
Attitude on waste disposal	14 (17.1)	57 (69.5)	11 (13.4)
Attitude on value of waste	25 (30.5)	47 (57.3)	10 (12.2)

*Values in parenthesis are percentages

In the results of waste management practices (Table 3),in the combined results, half of the respondents (50%) apply poor waste management practices and 35.4% and 14.6% have moderate and good practices respectively. When considering results of each dimension measured respected to waste management practices, for waste disposal, majority (79.3%)have moderate level which means they are not practicing safe disposal techniques more often or bad disposal methods more often and only 4.9% apply good practices and 15.9% still uses bad practices. However, the practice of segregation and recycling are very poor among managerial level officers as 67.1% and 76.8% respondents never or not often separate wastes prior to disposing of or recycling waste respectively. When further analyzing the waste management practices (Table 4), 46.3% respondents are often or more often do open dumping and 43.6% never or not often doopen dumping. Interestingly, 89% of respondents are still practicing burning of non-biodegradable material. However, in waste segregation, 50% separates waste often or very often and more than half (57.4%) separates biodegradable waste from non-degradable waste. But also the other 50% do not or rarely practice waste segregation. However, recycling practice of managerial level officers arestill at very poor lever, in which, only 84.4% never give or not often give recyclable waste to recycling centers and only 18.3% are practicing composting and also only 6.1% are willing to purchase recyclable goods or things produced by recycled materials.

Table 3:Level of waste management practices (combined) and practices on three different dimensions

	Poor	Moderate	Good
Level of waste management practices (combined)	41 (50) *	29 (35.4)	12 (14.6)
Level of waste management practices on three different dimensions			
Waste disposal practices	13 (15.9)	65 (79.3)	4 (4.9)
Waste segregation practices	55 (67.1)	12 (14.6)	15 (18.3)
Waste recycling practices	63 (76.8)	7 (8.5)	12 (14.6)

*Values on parenthesis are percentages

Table 4: Waste management practices apply by respondents

	Never	Not Often	Often	Very Often
I do open dumping	11 (13.4)*	33 (40.2)	33 (40.2)	5 (6.1)
I give my waste to the waste collectors	4 (4.9)	41 (50.0)	33 (40.2)	2 (4.9)
I burn non-degradable waste (plastic, polythene etc)	1 (1.2)	8 (9.8)	66 (80.5)	7 (8.5)
I separate waste as degradable and non-degradable	9 (11.0)	26 (31.7)	3 (3.7)	44 (53.7)
I separate e-waste and other hazardous waste from general waste	23 (28.0)	49 (59.8)	6 (7.3)	4 (4.9)
I practice waste segregation whenever I dispose of waste	17 (20.7)	24 (29.3)	35 (42.7)	6 (7.3)

I give recyclable material to recycling centers	20 (24.4)	50 (61)	6 (7.3)	6 (7.3)
I use biodegradable waste to produce compost	43 (52.4)	24 (29.3)	11 (13.4)	4 (4.9)
I prefer to buy goods made from recyclable and recycled material	27 (32.9)	50 (61.0)	2 (2.4)	3 (3.7)

*Values in parenthesis are percentages

Relationship between knowledge and attitudes on waste management practices

Pearson's Correlation Test was carried out to analyze the relationship between independent variables and the dependent variable. Analysis in Table 5 suggests,knowledge does not significantly correlated with waste management practices. Further, the dimensions of knowledge variable; knowledge on impacts of wastes, knowledge on waste segregation and knowledge on waste management also not significantly correlate with waste management practices.

However a significant relationship is found between the attitudes and overall practices with a weak positive correlation (r = 0.267). Also the relationship between attitude on public responsibility and practices also statistically significant which isaveragely strongly positive (r = 0.539). But attitude on waste disposal and value of waste are not significantly correlated with waste management practices. Hence it can be concluded that the attitudes of respondents on waste has a positive impact on their waste management practices especially attitude on their responsibility significantly influence on waste management practices.

Table 5: Correlation coefficients (r) between independent variables and its dimensions with dependent variable

	Waste Management Practices		
	Sig. (2-tailed)	r	Relationship
1.Knowledge	.236	0.132	No significant relationship
1a. Impacts of waste	.124	0.171	No significant relationship
1b. Waste segregation	.541	0.068	No significant relationship
1c. Waste management	.231	0.134	No significant relationship
2.Attitude	.015	0.267*	Weak Positive Correlation
2a. Public responsibility	.000	0.539**	Moderate Positive Correlation

| 2b. Waste disposal | .136 | 0.166 | No significant relationship |
| 2c. Value of waste | .908 | 0.013 | No significant relationship |

*Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed)

DISCUSSION

As per the findings of this study, the managerial level officers have a moderate level of knowledge towards solid waste management related aspects. Even though they are involved in different occupations, their environmental knowledge are at an acceptable level may be due to most of the respondents having tertiary level education. This is supported by the finding of Yadavannavar et al. in 2010. However, when considering each dimension of knowledge measured from the respondents it was noticeable that one fifth of them have poor knowledge on waste segregation aspects though it has become a legal requirement of the country now. This was more prominent having a result of 67.1% respondents practicing poor waste segregation practices.

Also the study found that, the level of attitudes of the majority of managerial officers in Sri Lanka to waste management was at moderate level or favorable level. This further proves the findings of Barloa et al. (2016); Ramos &Pecajas (2016) and Ranu et al. (2016). Since managerial officers are educated (majority have tertiary education), responsible people as well as decision makers in society, it can be expected that their positive attitudes have been created through their education and employment status. However, having 25% of respondents with less favorable attitudes for value of waste, it can be said that even though managerial officers are educated and responsible people in society there is a significant group who have negative attitudes on solid waste related aspects. However, Tatlonghari&Jamiasm (2010) have shown earlier that considering waste as a resource which can be actually benefited for people is a positive factor in campaigns that involve in development of desirable attitudes on solid waste management.

Though these managerial level officers possess an average level of knowledge on solid waste aspects, they showed poor practices which agree with Tikka et al, (2000) who has mentioned that according to some scholars, environmental knowledge does not lead to improve practice. Further, having significantly high number of respondents who have poor waste segregation practices revealing that even among educated people in society waste segregation is still not a common practice. This finding proved the results of Ehrampoush&Moghadam (2005), where a majority (66%) of medical science students in Yazd University in Iran did not practice solid waste segregation. According to Banga (2011) reasons for people to practice poor wastesegregation can be; considering it as a time

consuming activity, lack of a ready market for recyclable waste, not understanding the importance of waste separation and lack of space. These reasons may be applicable to the Sri Lankans as well because waste segregation is a still not a familiar practice for many people in our society and most of them see it as an extra burden and are also not very much aware about its importance.

Moreover, the recycling practices among the respondents were also significantly at poor level having 76.8% in the lowest category, revealing that still many Sri Lankans are not still familiar with recycling practices. This result was in line with the 25% of respondents who have less favorable attitudes on value of waste. It further disclosed that a considerable number of managerial officers who were sampled consider waste is just a dumping material which cannot be utilized to produce other value added products. This is one of the main reasons that solid waste has become a serious issue in Sri Lanka as the majority of solid wastes are still dumped without getting any secondary use. This is further in line supporting the findings of Bendak and Attili (2017) where only a small percentage of people in developing countries truly participate in recycling even though they are aware of the environmental degradation happening due to solid waste and how waste recycling can improve the quality of the environment and save resources. According to this past study, the reason for poor recycling practices in developing countries is lack of resources available to the public to encourage them for recycling. This can be a potential reason for Sri Lanka as well, as the level of practicing waste recycling is still at a very poor level among Sri Lankan people. Also as per the present study, managerial officers in Sri Lankaare still adopting wrong solid waste management practices such as open dumping which proves the findings of Adeolu et al. (2014) , Chima et al. (2011) and Ramos &Pecajas (2016). This shows that even among the educated and responsible citizens, still there is a considerable group which uses wrong and unaccepted waste management practices. This may be due to the fact that they are not considering it as a wrong action or they are under estimating its results to the environment even they possess moderate level knowledge and attitudes on solid waste.

The findings of relationships variables showed that there was no significant relationship between the overall knowledge or either it's three dimensions that were measured with the waste management practices. This reveals thatthe knowledge of managerial officers in Sri Lanka on solid waste does not affecttheir practicesin solid waste management. This further implies that even though they have average knowledge on solid waste they don't use it when they engage in waste management practices in their day today lives. This discloses that there is a gap between environmental knowledge and practices even among the highly educated and responsible people in Sri Lankan society.

However, the respondent's attitudes showed weakly positive significant relationship with their waste management practices. This relationship supports findings of previous studies (Barloa et al., 2016; Haider et al., 2015; Gusti, 2016). The majority of respondents had favorable attitudes and half of them

have moderate or good level of practices. Considering these results it can be said that when managerial level officers have more favorable attitudes on solid waste they tend to practice well waste management techniques. This is reliable with the theoretical assumption in the Theory of Planned Behavior, that the attitude is a determinant element in the intention (Fishbein & Ajzen, 1975). Attitude plays a significant role in environmental actions of people.

Through this study it was able to identify levels of knowledge, attitudes and waste management practices as well as attitudes as one of the factors influencing for solid waste management practices of an important segment of Lankan society (managerial officers). Also it was found that that knowledge had no impact on solid waste management practices among managerial officers in the population considered. Hence results of the study are important to identity suitable solutions for the current solid waste management issue to a certain extent. According to the results of this study, out of knowledge and attitudes, only attitude showed a significant relationship to the solid waste management practices of managerial officers. Therefore, creating positive attitudes on solid waste among this important group is vital. This can be achieved through proper awareness campaigns especially on the importance of proper solid waste management, to treat waste as a resource, to which value additions can be given, the importance of waste segregation and waste recycling etc. Since managerial level officers are decision makers and responsible people in the society and leaders for many people, creating correct attitudes among them is more influential to a wider range of society. Correct practices directly influence achieving proper solid waste management practices in the country.

CONCLUSION

Solid waste management is one of the major environmental and social issues in Sri Lanka, and one of the main barriers for implementing sustainable solid waste management practices is low community participation. Hence this study was carried out to identify the impact of knowledge and attitudes on solid waste management practices among managerial officers in Sri Lanka, one of the significant social groups in the country, due to their responsibility and influence on people and their direct involvement in decision and policy making. Majority ofmanagerial officers possess a moderate level of knowledge and favorable attitudes on solid waste aspects, but half of themare practicing poor waste management practices and the rest are practicing moderate or good practices. Significant percentage of managerial officers in Sri Lanka don't have positive attitudes on the value of waste and interestingly, still a substantial number of them still practice poor waste management practices such as open dumping and open burning. Waste segregation and recycling behavior among the managerial officers are also at very poor level. Knowledge on solid waste of managerial officers do not disclose a significant relationship with their waste management practices, but their attitudes on waste show a

significant relationship with the practices and which is a positive correlation.Thus, establishment of proper attitudes especially on waste segregation, value of waste and recycling among managerial officers need to be considered as critical aspects when designing and implementing effective and sustainable waste management practices as they are influential group and their correct attitudes can significantly affect the major part of society. Further, it is required to investigate about other social groups of society as well to formulate sustainable solid waste management practice(s) in the country.

REFERENCES

Adeolu, A.T., Enesi, D.O., &Adeolu , M.O. (2014), "Assessment of Secondary School Students' Knowledge, Attitude and Practice towards Waste Management in Ibadan, Oyo State, Nigeria", *Journal of Research in Environmental Science and Toxicology*, Vol. 3, No. 5, pp. 66-73.

Arora, L., &Agarwal , S. (2011). "Knowledge, Attitude and Practices regarding Waste Management in Selected Hostel Students of University of Rajasthan, Jaipur', *International Journal of Chemical, Environmental and Pharmaceutical Research*,Vol. 2, No. 1, pp. 40-43.

Bandara, N. J. (2008), "Municipal Solid Waste Management – The Sri Lankan Case", Conference on Developments in Forestry and Environmental Management in Sri Lanka.Kaluthara" Sri Lanka.

Banga, M. (2011), "Household Knowledge, Attitudes and Practices in Solid Waste Segregation and Recycling: The Case of Urban Kampala", *Zambia Social Science Journal*, Vol. 2, No. 1, pp. 27-39.

Barloa, E. P., Lapie, L., & de la Cruz, C. (2016), "Knowledge, Attitudes, and Practices on Solid Waste Management among Undergraduate Students in a Philippine State University', *Journal of Environment and Earth Science*, Vol. 6, No. 6, pp. 146-153.

Bendak, S. &Attili , A. B. (2017), "Consumers Attitude and Behavior Towards Domestic Waste Recycling in Developing Countries: A Case", *Advances in Recycling & Waste*, Vol. 2, No. 2, pp. 124.

Bhuiyan, S. (2010), "A crisis in governance: Urban solid waste management in Bangladesh", *Habitat International*, Vol. 34, No. 1, pp. 125-133.

Chima, G. N., Ezekwe, I. C., &Digha, N. O. (2011), "An assessment of medical waste management in health institutions in Yenagoa, South-South, Nigeria", *World Review of Science, Technology and Sustainable Development*, Vol. 8, No. 2/3/4, pp. 224-233.

Ehrampoush, M., &Moghadam, M. (2005), "Survey of knowledge, attitude and practice of Yazd University of Medical Sciences students about solid wastes disposal and recycling', *Iranian Journal of Environmental Health Science and Engineering*, Vol. 2, No. 2, pp. 26-30.

Fishbein, M., &Ajzen, I. (1975). Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research. http://people.umass.edu/aizen/f&a1975.html. 2017.06.12

Guerrero, L. A., Maas, G., &Hogland, W. (2013), "Solid waste management challenges for cities in developing countries", *Waste Management,* Vol. 33, pp. 220-232.

Gusti, A. (2016), "The Relationship of Knowledge, Attitudes, and Behavioral Intentions of Sustainable Waste Management on Primary School Students in City of Padang, Indonesia", *International Journal of Applied Environmental Sciences*, Vol. 2, No. 5, pp. 1323-1332.

Haider, A., Amber, A., Ammara, S., Mahrukh, K., & Aisha , B. (2015), "Knowledge, Perception and Attitude of common People towards Solid Waste Management-A case study of Lahore, Pakistan", *International Research Journal of Environment Sciences*, Vol. 4, No. 3, pp. 100-107.

Hikkaduwa, H.N., Gunawardana, K., Halwatura, R., &Youn, H. (2015), "Sustainable Approaches to the Municipal Solid Waste Management in Sri Lanka", 6th International Conference on Structural Engineering and Construction Management 2015. Kandy, Sri Lanka.

Jatau, A. A. (2013), "Knowledge, Attitudes and Practices Associated with Waste Management in Jos South Metropolis, Plateau State", *Mediterranean Journal of Social Sciences*, Vol. 4, No. 5, pp. 119-127.

Jing, S., Huang, G. H., Xi, B. D., Li, Y. P., Qin, X. S., &Huo, S. I. (2009), "A hybrid inexact optimization approach for solid waste management in the city of Foshan, China", *Journal of Environment Manage,* Vol. 91, No. 2, pp. 389-402.

Kofoworola, O. (2007), "Recovery and recycling practices in municipal solid waste management in Lagos, Nigeria", *Waste Management*, Vol, 27, No. 9, pp. 1139-1143.

Mbuligwe, S.E. (2002), "Institutional solid waste management practices in developing countries: A case study of three academic institutions in Tanzania", *Resource Conservation and Recycling*, Vol. 35, No. 3, pp.136-141.

McDougall, F. R., White, P., Franke, M., & Hindle, P. (2001), *Integrated Solid Waste Management:a Life Cycle Inventory,* Second edition published by Blackwell Science.

Minghua, Z., Xiumin, F., Rovetta, A., Qichang, H., Vicentini, F., Bingkai, L., et al. (2009), "Municipal solid waste management in Pudong New Area, China", *Waste Management,* Vol. 29, No. 3, pp. 1227-1233.

Moghadam, M. R. A., Mokhtarani, N., &Mokhtarani, B. (2009), "Municipal solid waste management in Rasht City, Iran", *Waste Management*, Vol. 29, No. 1, pp. 485-489.

Moller, J., &Uhre, L. (1996), *International Directory of Solid Waste Management*, James and James Science Publishers Limited, London.

Ramos, J. N., &Pecajas, E. (2016), "Knowledge, Attitudes And Practices In Solid Waste Management Among The Secondary Schools In The Division Of Leyte", *International Journal of Engineering Sciences & Research Technology*, Vol. 5, No. 7, pp. 1452-1463.

Ranu, R., Santosh, K., &Manju, L. (2016), "Knowledge, Attitude and Practice Regarding Biomedical Waste Management amongst Health Care Personnel in a Medical College Hospital in Trivandrum", *National Journal of Community Medicine,* Vol. 7, No. 6, pp. 457-460.

Srivastava, V. S. A. (2015), "Urban solid waste management in the developing world with emphasis on India: challenges and opportunities", *Reviews in Environmental Science and Bio/Technology*, Vol. 14, No. 2, pp. 317-337.

Tatlonghari, R. V., &Jamias, S. (2010), "Village-Level Knowledge, Attitudes and Practices on Solid Waste Management in Sta. Rosa City, Laguna, Philippines", *Journal of Environmental Science and Management*, Vol. 13, No. 1, pp. 35-51.

Tikka , P.M., Kuitunen , M., &Tyns , S. M. (2000), "Effects of educational background on students' attitudes, activity levels and knowledge concerning the environment", *Journal of Environmental Education*, Vol. 52, No. 1, pp. 31-48.

Visvanathan, C. (2006), "Domestic solid waste management in South Asia', 3 R South Asia Expert Workshop. Kathmandu, Nepal.

Yadavannavar, M., Berad, B. A., Aditya, S., &Jagirdar, P. B. (2010),"A Study of Knowledge, Attitude, and Practices in a Tertiary Health Care Institution in Bijapur",*Indian Journal of Community Medicine*, Vol. 35, No. 1, pp. 170–171.

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