DOI 10.70906/20231703087093

Article

Determining the Attitudinal and Perceptual Dynamics of Society Towards Waste Segregation and Management: Empirical Insights from Kolkata's Populace

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Abstract

Against this hyperbolized era of globalization, the skyrocketing production and consumption of various products and materials generate enormous amounts of waste. As of late, initiatives have been undertaken in metropolitan Kolkata by the Kolkata Municipal Corporation to segregate waste in terms of dry waste and wet waste in order to make waste recycling easier and cut the load of waste going to landfills, thereby combating the adverse effects of wastes on the environment and humankind. Society is also expected to be parallelly responsive towards the overwhelming consciousness about the environment sparked by the rapid escalation in the volume of waste. To serve this purpose, the current research study purports to examine and analyze the attitudes and behaviour of the people of Kolkata towards waste segregation and management.

Keywords: *Waste Segregation; Consumer Awareness; Attitudes and Behaviour; Sustainability; Kolkata*

How to cite: Mitra, S. S., Arockiam, A., K, J., Costa, M., Hembrom, A., & Sharma, P. (2023). Determining t he attitudinal and perceptual dynamics of society towards waste segregation and management: Empirical i nsights from Kolkata's populace. Journal of Management and Entrepreneurship, 17(3), 87–93

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Abstract

Background Contemplations

The skyrocketing globalization coupled with the rapid pace of industrialization, the proliferation of technological innovations, and the upsurge in consumption trajectories of people by their rising disposable income have all collectively contributed to a generation of waste. This has posed a severe threat to the environment and the people, resulting in the emergence of sacrosanct concepts of "environmental sustainability" and "sustainable development." Modern society is now more conscious about the environment and is expected to embrace and adopt myriad ways by which the hallowed concept of sustainability can be achieved. The astounding change has strongly supported this noticed in the attitudes and behaviour of people when talking in the light of adopting the sustainable manner of consumption practices, wherein the consumers have exhibited a gargantuan proclivity towards efficient usage of resources and keeping the wastage of

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resources to a minimum as an attempt to reduce the ecological repercussions. In this context, it is almost imperative to talk about the behaviour of consumers towards waste reduction and management. Hence, the present research endeavour would discuss the perception of the people of Kolkata towards waste segregation and management initiatives.

Introductory Observations

The amount of waste generation in India continues to increase at an alarming rate due to such continuous developments and the high birth rate of the nation. Kolkata is considered to be one of the most polluted cities in India and even across the world. According to a study by Chattopadhyay et al. in 2009, "the massive 8 million population of Kolkata generates around 3000td (-1) of municipal solid waste at an alarming rate of 450-500g per capita per day." Open dumping, the menace of groundwater pollution, and the waning capacity of an existing landfill site at Dhapa in the eastern Kolkata region are significant conundrums for the city of joy. This has triggered the West Bengal Housing Infrastructure Development Corporation to sanction an additional 30-acre landfill site at Rajarhat in the New Town region of Kolkata due to the inept ability of the existing landfill site to control the volumes of waste handling. The most disquieting factor for Kolkata in waste management has been the lack of adequate waste segregation techniques until early 2019 when the Kolkata Municipal Corporation took a significant initiative in properly segregating and handling solid wastes. The KMC had even allotted Rs.657.16 crore to the solid waste management department. The basic idea behind this initiative was that segregation would help extend the life of a garbage dumping ground by several more years by reducing the volume of waste.

Review of Associated Literature

The Environment Protection Act of 1986 gave the necessary power to the Central Government to tackle all kinds of waste in any region in India. The 74th Amendment Act of 1992 saw the municipalities bestowed with the power of waste management and the key responsibilities of public health, sanitation and solid waste management. The National Environment Policy of 2006 sensed an immediate need for the local bodies to segregate municipal solid waste to manage the issue efficiently. The report on the National Mission for the Sustainable Habitat subcommittee recognised an urgent requirement for the communities to actively participate in waste management initiatives, especially waste segregation practices. Sudha et al. (2016), in their study, proposed a head-turning solution for the conundrum of waste segregation and management, wherein they opined the use of Artificial Intelligence (AI) and Deep Learning Algorithms (DEA) for the detection of garbage waste. A reason to use technology-intensive methods was the current system of segregation prevalent in India, which was heavily dependent on labour and relatively slow. Besides this, manual segregation techniques could expose the labourers to various health hazards. Anitha et al. (2014), in their study, suggested the use of an automated solution for waste segregation attempted at recycling waste for the generation of energy. In their study, Aleena et al. (2016) opined for a system that would help segregate the three main categories of wastes, which are plastic, organic and metallic.

Although quite a few works of literature in the past have deliberated upon the techniques of waste segregation, an intricate analysis of further background literature would reveal that there hardly exists any literature that addresses people's behaviour towards waste segregation and management initiatives. Therefore, undertaking such a study delving into the present issue is an arduous challenge for any researcher. It has been noticed that awareness and cognition of people regarding waste segregation is significantly less, as evidenced in the households and several commercials in Kolkata, as they still fail to take even the slightest of initiatives. In simple terms, awareness would mean "consciousness." Saritha et al. (2015), whose study delved into e-waste management, emphasised awareness to bring sustainability. Irra (1999) also emphasised environmental sustainability through using clean technologies in the metropolitan Klang Valley in Malaysia. The study's findings revealed the prodigious significance of awareness levels, which could result in sustainable waste management. A similar study by Ercan & Bilen (2014) also deliberated on awareness regarding e-waste, where the essence was in examining the attitudes and behaviour of primary school students. Analysing the perception of primary school students in determining their

environmental knowledge and sensitivity response is also essential to existing literature on environmental sustainability and consumer awareness in Ankara, Turkey (Kaya & Turan, 2005). In the present study, awareness would go a step further beyond the familiarity with waste segregation in the cognitive scaffolds of people's minds. The ability to identify, recognise and recall the initiatives of waste segregation is the major conundrum among the citizens of Kolkata.

A brief yet compact definition of "cognition" may be asserted as a mental procedure via which internal or external inputs may be transpired, decreased, elaborated, stored, recovered and consumed. It is a motley assortment of a plethora of functions like "perception", "attention", "memory coding", "retention and recalls", "decision-making", "reasoning", "problem-solving", "imaging", "planning", and "executing actions". Ahn, J. and Back (2017) found that cognition profoundly influences customers' attitudes towards integrated resort brand loyalty by surveying 443 respondents. In their study, Luo and Chea (2018) attempted to explain e-service behaviours, wherein they asserted that cognitive appraisal of "incident-handling" positively impacts e-service customer behaviour. Roy (2016) conducted yet another significant study wherein the perceptions of societal members of Kolkata towards waste recycling initiatives were probed. It was found that cognition positively influenced individuals' attitudes and behaviour towards waste recycling initiatives.

The peers, colleagues, opinion leaders, social circle, and more also play a gargantuan role in shaping people's awareness, cognition, attitudes and behaviour towards such clean practices. This is termed a "Subjective Norm". In their study, Barbera and Ajzen (2020) explored the positive influence of Subjective Norms on the intentions of individuals towards food wastage. Wan et al. (2017) explored a positive association between subjective norms and consumer behaviour towards recycling waste. They reported that subjective norm increases the likelihood of consumers towards waste recycling initiatives.

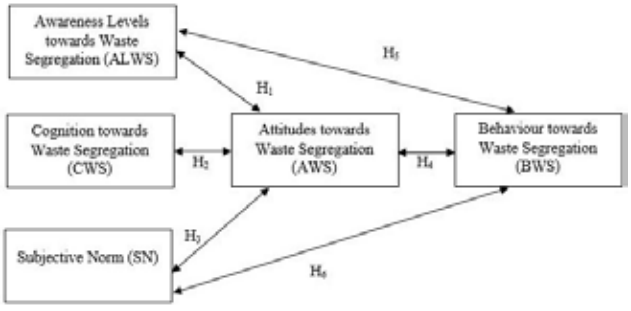
Attitude may be defined as the degree or extent to which an individual has a favourable or unfavourable evaluation of the concerned behaviour. In the words of Schiffman and Kanuk (2004), "consumer attitude is a learnt predisposition to behave consistently positively or negatively rooted in feelings and opinions related to something." Attitudes play a mammoth role in influencing consumer behaviour. In light of the literature review, we shall establish our research model and frame our hypotheses to give a practical conclusion to our research objectives.

Research Objective

To examine and analyze the attitudes and behaviour of consumers of Kolkata towards waste segregation

Research Model and Hypothesis Formulation

Figure 1: Research Model of the present research study (Source: Self-developed by authors)



The above research model shows us the critical constructs of Awareness Levels towards Waste Segregation (ALWS), Cognition towards Waste Segregation (CWS), Subjective Norm (SN), Attitude towards Waste Segregation (AWS) and Behaviour towards Waste Segregation (BWS).

H1: "Awareness Levels have a significant relationship with Attitude towards Waste Segregation"

H2: "Cognition has a significant relationship with Attitude towards Waste Segregation."

H3: "Subjective Norm has a significant relationship with Attitude towards Waste Segregation."

H4: "Attitude towards Waste Segregation has a significant relationship with Behaviour towards Waste Segregation."

H5: "Awareness Levels have a significant relationship with Behaviour towards Waste Segregation"

H6: "Subjective Norm has a significant relationship with Behaviour towards Waste Segregation."

Data and Methodology

The methodology comprises both secondary as well as primary data. For secondary data collection procedures, various authentic and reliable databases like Proquest, EBSCO, DOAJ and Google Scholar have been accessed. This has helped to develop a solid conceptual base for the study. For primary data collection, a structured questionnaire has been used, which has been mailed as well as randomly administered to people of Kolkata following the method of convenience sampling. The questionnaire has been kept short to be perfect for a survey and consists of a total of 23 questions only. The total number of respondents surveyed was more than 400, but due to some "erroneous and incomplete" responses, only 363 were valid and considered. A "Five-Point Likert" scale has been used to measure the concepts in the questionnaire. The data collected were processed by SPSS-AMOS v23.

Data Presentation and Discussion of Results

- ***Demographic Profiling***

Table 1: Representation of Descriptive Statistics (Source: Author's Calculations)

Demographic Construct	Classification	Population Statistics	Percentage
Gender	Male	206	0.57
	Female	157	0.43
	TOTAL	363	1.00
Age	Below 18	16	0.05
	18-24	89	0.25
	25-34	103	0.28
	35-44	92	0.25
	45-54	55	0.15
	55-60	8	0.02
	TOTAL	363	1.00
Occupation	Student	105	0.29
	Service	156	0.43
	Business	42	0.16
	Others	60	0.12
	TOTAL	363	1.00
Monthly Income	Less than 10000	4	0.01
	10001-25000	134	0.37
	25001-50000	162	0.45
	50001-100000	44	0.12
	Above 100000	19	0.05
	TOTAL	363	1.00

As observed above, the number of male respondents (n=206) exceeds that of female respondents (n=157). Most of the respondents belong to a young age group in the category of 25-34 years. The majority of the respondents are either students or service members. We also see that most respondents have a moderate income between 10.1K-25K and 25.1K-50K.

- ***Reliability Analysis***

To test the internal consistency of the variables in the current research study, "Cronbach's Alpha was used to examine the scale reliability of the constructs. All the "Cronbach's Alpha" values, as evidenced in the above table, exceed the ideal value of 0.7, while "Correlations of Corrected Items" are above the ideal value of 0.5.

Table 2: Reliability Statistics (Source: Author's Calculations)

Construct	Cronbach's Alpha	Items	Total Correlation Value of Corrected Item	Cronbach's Alpha When Item Removed
Total	0.992	23	-	-
Awareness Level towards Waste Segregation	0.986	ALWS1	0.972	0.975
		ALWS2	0.948	0.986
		ALWS3	0.966	0.980
		ALWS4	0.963	0.981
Cognition towards Waste Segregation	0.989	CWS1	0.964	0.984
		CWS2	0.942	0.990
		CWS3	0.975	0.987
		CWS4	0.990	0.985
		CWS5	0.970	0.986
		CWS6	0.953	0.893
Subjective Norm	0.978	SN1	0.912	0.977
		SN2	0.974	0.948
		SN3	0.971	0.956
Attitude towards Waste Segregation	0.982	AWS1	0.956	0.978
		AWS2	0.965	0.973
		AWS3	0.933	0.980
		AWS4	0.972	0.975
		AWS5	0.960	0.977
		AWS6	0.889	0.972
Behaviour towards Waste Segregation	0.972	BWS1	0.966	0.955
		BWS2	0.876	0.972
		BWS3	0.955	0.963
		BWS4	0.960	0.960

Source: Author's own computation.

- ***Convergent and Divergent Validity Test***

A convergent validity test has been conducted to check for the convergence of items. According to Forner & Lacker (1981), "the convergent validity of scale items is determined by their respective factor loadings, composite reliability and average variance extracted." The loadings of Confirmatory Factor Analysis (CFA) and composite reliabilities of all factors report figures above the required level of 0.7, while AVE report figures above the required level of 0.5.

Table 3: Convergent Validity Results (Source: Author's Calculations)

Construct	Items	Factor Loading	AVE	CR
Awareness Level towards Waste Segregation	ALWS1	0.942	0.950	0.856
	ALWS2	0.912		
	ALWS3	0.963		
	ALWS4	0.958		
Cognition towards Waste Segregation	CWS1	0.976	0.926	0.955
	CWS2	0.966		
	CWS3	0.972		
	CWS4	0.963		
	CWS5	0.978		
	CWS6	0.972		
Subjective Norm	SN1	0.975	0.953	0.852
	SN2	0.968		
	SN3	0.966		

Using the "square root of ACE" and the "correlation coefficient matrix" is vital for testing the divergent validity of constructs. As per Fornell & Larcker (1981), "discriminant validity was obtained by comparing the shared variance between factors with the AVE from the individual factors." The matrix below shows that MSV and ASV are less than AVE between factors. Also, the square root of AVE is higher than the inter-construct correlations, satisfying the discriminant validity test.

Table 4: Divergent Validity Results (Source: Author's Calculations)

	Inter-construct Correlations		
Construct	ALWS	CSW	SN
ALWS	0.972		
CSW	0.975	0.960	
SN	0.951	0.949	0.972

Source: Author's own computation.

- ***Test for Structural Equation Modelling***

SEM has been performed to probe the relationships between five key variables: ALWS, CSW, SN, AWS and BWS. The rationale is to test the fit between the research model and the obtained data. The first stage of inference about SEM results encompasses a review of fit indices. All the fit indices, when juxtaposed with their corresponding values, which has been suggested, will give a good model fit "Ratio of Chi-square to its Degrees of Freedom" ($\chi 2$/ df) = 1.977, "Goodness of fit index" (GFI) = 0.956, "Adjusted Goodness of fit index" (AGFI) = 0.933, "Comparative Fit Index" (CFI) = 0.981, "Relative Fit Index" (RFI) = 0.968 and "Root Mean Squared Error of Approximation" (RMSEA) = 0.042.

Table 5: Model Fit Indices for the Goodness-of-fit Measures (Source: Author's Calculations)

Goodness of Fit Measure	Recommended Value	Actual Value of Measures	Result of Model Fit
CMIN/DF	≤ 3.00	1.977	Good
GFI	≥ 0.90	0.956	Good
AGFI	≥ 0.90	0.933	Good
RFI	≥ 0.90	0.968	Good
CFI	≥ 0.90	0.981	Good
RMSEA	≤ 0.05	0.042	Good

To this end, the results of hypothesis testing have been obtained. The table below clearly represents the validation of all the hypotheses through the path analysis. It can be concluded that awareness levels, cognitive parameters and subjective norms favourably impact attitudes of society towards waste segregation, with each reporting figures of (β= 0.382, P<0.05), (β= 0.603, P<0.05) and (β= 0.457, P<0.05) respectively, thereby supporting H_1, H_2 and H_3. The same could be safely asserted for the relationship between attitudes, awareness levels and subjective norm, which are all significantly associated with the behaviour towards waste segregation with each reporting figures of (β= 0.749, P<0.05), (β= 0.411, P<0.05) and (β= 0.475, P<0.05) respectively substantiating H_4, H_5 and H_6.

Table 6: Results of Path Validation (Hypothesis Testing) (Source: Author's Calculations)

Hypotheses	Path	Coefficient	Direction	Results
H1	ALWS→AWS	0.382	Positive	Supported
H2	CWS→AWS	0.603	Positive	Supported
H3	SN→AWS	0.457	Positive	Supported
H4	AWS→BWS	0.749	Positive	Supported
H5	ALWS→BWS	0.411	Positive	Supported
H6	SN→BWS	0.475	Positive	Supported

Source: Author's own computation.

Deliberation of Research Findings

The current research endeavour is a novel effort to unravel the attitudes and preferences of society towards waste segregation initiatives in Kolkata. The reason for selecting Kolkata is the skyrocketing rate of pollution and substantial waste, which makes the city one of the most polluted places in the world. Given the devastating scenario, it is almost imperative to

discuss about the innate psyche of consumers towards waste segregation. The study revealed a positive relationship between awareness levels, cognition, subjective norms and attitudes towards waste segregation. Awareness or consciousness regarding waste segregation for achieving sustainability is instrumental as it may bring to the forefront the current scenario of a plethora of challenges society faces due to the ever-increasing levels of waste at an alarming rate.

Furthermore, cognition is more important than awareness itself, as only consciousness regarding waste or waste segregation cannot fulfil this noble intention. The knowledge and instincts of the society resulting from awareness levels need to take a practical shape by which the expected changes can be brought. Moreover, the subjective norm has a gargantuan role as the social influences stemming from society (peers, colleagues, friends, and more.) have an inexorable influence on people's attitudes and behaviour. Positive embracement of waste segregation initiatives generates positive attitudes and behaviour among the society to take up such a noble endeavour. It was also found that attitudes, awareness levels and cognition were closely knitted with waste segregation behaviour. Prolonged attitudes take the form of behaviour, which changes not only the modus operandi of the person but also his mindset and demeanour. It is a no-brainer that positive and prolonged attitudes of society towards waste segregation may open the doors for permanent behaviour towards such initiatives.

Conclusion

The waste segregation initiatives were a much-needed tonic in waste management. Considering the pyrotechnics of the latest technologies and the adeptness of modern society, such initiatives could ameliorate the present conundrum of waste management to a prodigious extent. The generation of waste cannot be evicted entirely, but it can be reduced to a great extent and managed judiciously. The idea and initiative of waste segregation is a solid approach to the problem. Although several cities in India are facing the dilemma of waste management, a closer introspection would reveal that in the present times, the issue of waste management is being more keenly addressed and managed by the government, local authorities and society. In fact, over the last couple of years, there have been many debates and deliberations on the issue of waste segregation and management. Myriad environmental activists, corporate hotshots and other potential stakeholders have been mulling over the present issue, which has made it an intriguing area of research as well. However, there are still questions about the eventual scenario given Kolkata's ever-increasing population, which is expected to make waste management extremely gruelling in the upcoming years.

Managerial Implications

Building an awareness in society is a vital key to waste segregation. The state governments, municipal corporations, local bodies and the general public can create massive awareness programs regarding waste segregation (Mamat & Chong, 2007). Such practices should be encouraged and embraced among the people to give the idea a practical shape. This initiative has taken wings in Kolkata in the past couple of years, where each house has been provided with two separate bins for waste segregation, one for dry waste and the other for wet waste, thereby adhering to the mantra of "think global, act local" for the long haul. In this context, educational institutions could also play a prodigious role in educating its students and employees, who are further expected to practice it and encourage others to do so. Besides, a few educational institutions have also organized eye-twitching programs like webinars and e-conferences to address the present issue. Many Higher Educational Institutions are also segregating their waste generation via electronic equipment. This augurs well for society and upcoming generations who could primarily benefit from such endeavours and unite for a graft to achieve the sacrosanct goal of environmental sustainability.

References

Aleena V. J., Balakrishnan, K., Rosmi, T. B., Swathy Krishna K. J., Sreejith, S. & T. D. Subha. (2016). Automatic Waste Segregator and Monitoring System. Journal of Microcontroller Engineering and Applications, Vol. 3, No. 2.

Anitha, V., Gomathi, Nayaki P., Ramya K., Kayalvizhi, E. and Rajkamal R. (2014). A novel approach for waste segregation at source level for effective

generation of electricity — GREENBIN. IEEE Xplore.

Sudha, S., Vidhyalakshmi, M., Pavithra, K., Sangeetha, K. and Swaathi, V. (2016). An automatic classification method for environment: Friendly waste segregation using deep learning. IEEE Technological Innovations in ICT for Agriculture and Rural Development (TIAR), Chennai, 2016, pp. 65-70.

Roy, S. (2016). Anatomizing the Dynamics of Societal Behaviour towards E-waste Management and Recycling Initiatives: A Case Study of Kolkata, India. Management and Labour Studies, Vol. 4, No. 1, pp. 1-18.

Saritha, V., Kumar, K.A. & Srikanth, V. N. (2015). Consumer attitudes and perceptions on electronic waste: An assessment. Pollution, Vol. 1, No. 1, pp. 31-43.

Chattopadhyay, S., Dutta, A. & Ray, S. (2009). Municipal solid waste management in Kolkata, India – a review. Waste Management, Vol. 29, No. 4, pp. 1449-1458.

Ercan, O. & Bilen, K. (2014). A research on electronic waste awareness and environmental attitudes of primary school students. Anthropologist: International Journal of Contemporary and Applied Studies of Man, Vol. 17, No. 1, pp. 13–23.

Fornell, C., & Larcker, D.F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, Vol. 18, No. 1, pp. 39–50.

Irra, M.S. (1999). Sustainable waste management: An awareness study on cleaner technologies in the Klang Valley (Master's thesis), University of Malaya. Kuala Lumpur, Malaysia: University of Malaya.

Kaya, N.Ç., & Turan, F. (2005). Environmental knowledge and sensitivity among eight-grade students: A study of the state and private primary schools' sample in Ankara. Eurasian Journal of Educational Research, Fall, Vol. 21, pp. 103–112.

Mamat, R.C., & Chong, T.L. (2007). Public's role in solid waste management. IMPAK: Quarterly DOE update on Environment. Development and Sustainability, Vol. 4, No.4, pp. 5–7.

Wu, J-H., Shen, W-S., Lin, L-M., Greenes, R. A. & Bates, D. W. (2008). Testing the technology acceptance model for evaluating healthcare professionals' intention to use an adverse event reporting system. International Journal for Quality in Health Care, Vol. 20, No. 2, pp. 123-129.

Roychowdhury, S. (2014). For clean India to work, country needs to solve its waste disposal problem. Retrieved from http://scroll.in/article/682335/for-clean-india-to-work-country-needs-to-solve-its-waste-disposal-problem

Schiffman L. & Kanuk L., (2004). Consumer Behavior, International Eighth Edition. New Jersey Pearson Prentice Hall.

Neisser, U. (1967). Cognitive psychology. New York: Appleton-Century-Crofts.

Ahn, J. & Back, Ki-J. (2017). Influence of brand relationship on customer attitude toward integrated resort brands: a cognitive, affective, and conative perspective. Journal of Travel & Tourism Marketing, Vol. 35, No. 4.

Luo, M. M. & Chea, S. (2018). Cognitive appraisal of incident handling, affects, and post-adoption behaviors: A test of affective events theory. International Journal of Information Management, Vol. 40, pp. 120-131.

Barbera, F. L. & Ajzen, I. (2020). Control Interactions in the Theory of Planned Behavior: Rethinking the Role of Subjective Norm. Europe's Journal of Psychology, Vol. 16, No. 3.

Wan, C., Shen, G. Q. & Choi, S. (2017). Experiential and instrumental attitudes: Interaction effect of attitude and subjective norm on recycling intention. Journal of Environmental Psychology, Vol. 50, pp. 67-79.