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Reducing The Present And Future Plastic Waste, Energy, And Environmental Footprints With Reference To Guwahati, Assam

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Abstract:

Presently plastic waste has become one of the crucial environmental issues in India due to the growth of urbanized tremendously. Plastic pollution in the environment is a global concern for terrestrial and marine ecosystems, affecting living creatures. Plastic particles found in animal stomachs and human lungs promote the development of cancerous tissues, which can lead to significant diseases in both live creatures and humans. People around India are compelled to rethink the usage of plastic and its proper disposal due to its non-biodegradability and harmful gas emissions from plastic waste. Despite this crucial problem, plastic debris can be a turning point for an environmental, economic, and social resource after improving waste handling and management skills. Guwahati, the gateway of the North-East region of India has the potential to recover valuable resources from plastic waste while also improving the city's plastic waste management system. The purpose of this study is to investigate the eagerness for discernible change in the human population related to the current procedure of waste handling and management techniques for improving a sustainable environment in Guwahati City. This study developed a regression equation using a logistic regression model to analyze the three factors Plastic waste disposal behavior (PWDB), economic behavior (EB), and motivation (financial motivators) towards efficient waste handling obtained after doing a factor analysis of 849 valid responses through different variables. The study also investigated the validity of model fitness and the relationship between these factors through structural equation model. The overall analysis explored that these three factors were positively correlated and significant ($p<0.000$) hence, they will be able to affect each other and would be able to optimize the waste handling efforts with the least cost. This research article suggests that PWDB, EB, and Motivation (financial motivators) toward recycling plastic waste are the key drivers of reducing waste.

Keywords: Plastic pollution, Recycling behavior, Greenhouse gas, climate change, and Public awareness.

1. Introduction

Mitigation of plastic waste can be considered an environmental and economic resource (Afroz et al., 2017). But the inefficient plastic waste management causes an unstable environment and initiates global warming. Plastic waste has been a significant and increasing part of human-rejected materials. Though nearly 100 grams of generated plastic waste is thrown away every seven days per house, there is an unhygienic environment posed by waste plastics which is much more than has been suggested by environmental experts (Swarup et al.,1992). Therefore, plastic waste management has now become a critical issue due to the increase in different food habits of people coming to urbanized areas in search of an occupation and/or education (Kumar et al., 2017; Willis et al., 2018]). Plastics are generally non-

biodegradable and inefficient waste handling has resulted in the tremendous generation of 6.4 billion metric tons of waste since 1950 (Tiseo, 2019). The enormous amounts of plastic waste, generated over the years has disturbed the entire eco-system critically and especially the human health care system, because of the environment pollution (CBBC News round) and is becoming more complicated with the passage of time as the worldwide generation of plastic pollutants, to the tune of nearly 1.6 million tons/day (Benson et al., 2021). The situation of plastic debris worsened during Covid 19 pandemic (Vanapalli et al., 2021), nearly 3.4 billion masks/day were discarded during the pandemic period (Benson et al., 2021). Figure 1 shows how plastic debris is scattered on some of the roadsides in Guwahati city and has become a nuisance to the pathway of the pedestrian.

Figure 1: Scattering of plastic debris in Guwahati city

Based on the application of plastics, their life span can be classified into two parts; long time and short time. Long-time plastics take more time to convert into waste. but short time plastics like packaging materials, and carry bags have a shorter usage span and are discarded within a few working days resulting in a large volume of plastic waste (Geyer R., 2020; Geyer R., et al., 2017). A considerable amount of these shorter usage span plastics is produced and discarded, with in an instant, once their use/utility is fulfilled and the entire process don't add any value to environmental and economic resources (Geyer R., 2020; Ellen MacArthur Foundation, 2017). The increasing trend of using short life-span plastics in the households and its production growth has worsened the entire waste handling system globally, because it is accounting an increase of nearly 15-35% of domestic waste (Tencati et al., 2016). The lower awareness level and lack of prevalent mode in waste management techniques have caused the leakage of leachate from discarded plastic waste into the earth's surface (Barnes et al., 2009) disturbing aquatic and terrestrial eco-system (Jambeck et al., 2009) followed by increasing greenhouse gases.

Plastic debris clogs the drainage system resulting in water stagnation during the rainy session which can be a major civic health problem. Stagnant water is an excellent breeding ground for mosquitoes that become a facilitator for transmition of the diseases like malaria and dengue (WHO). Moreover, stagnant water for six days or more, can cause a change in bacterial community composition and assist in increasing its cell count from an amount of 10^3 cells/ml to 7.8 x 10^5 cells/ml which can be endangering human health and animal body (Wikipedia**;** Ling et al.,2018). After a certain time period, the plastic litter breaks down into tiny particles and ends up in trees, parks, and gardens as a result of blowing wind and can kill birds and small living things after getting ingested by them. The state governments under the union of India asserted that even the people of hilly areas toss plastic and polythene bag into the jungle during their travel for search fish in a reservoir inside the public park. Thus, it makes severe water logging problems, risks to wild animals, and poses ecological problems (AIR 1997).

Recycling can reduce the environmental threat that arises from discarded plastic waste and thereby contribute to the value-added resource in the ecological, societal, and economical sectors of a country (US Environmental Protection Agency 2012) and therefore it is now globally accepted to control the environmental impact, reduction of greenhouse gases, and thereby

minimizes the landfilled (Moh and Manaf 2014). The success of recycling depends on the perceptible change in human behavior toward the waste-handling method (Delistavrou et al. 2005). Nowadays many developing countries are considering recycling as a widely accepted waste-handling method but the user's cooperation is still far from ideal norms in these countries (Tilikidou 2001; Delistavrou 1999).

Recently, various researchers have observed a perceptible change in attitude, knowledge, and behaviors concerning greenhouse gas emission, waste handling skills, and environmental performance indicators like climate change, energy demand, and depletion of natural resources. The researchers have also revealed vast differences and gaps between these ethics of waste handling techniques and knowledge, thought, attitude, and behaviors towards a sustainable environment (Masud et al.,2015). The developed countries are more cautious and have higher awareness levels compared to developing countries (Pew Global Attitudes Project, 2006) though these developing countries are directly suffering from climate change issues and increasing greenhouse gases. Guwahati city is also no exception in its citizens' public awareness level of its citizen where nearly 38% of people were aware of 3R (Changkakoti D., 2018; Sarma M., 2017). It reveals that most people living in Guwahati city are still unaware of reducing, reusing, and recycling behavior toward a sustainable environment. Moreover, awareness of different waste management techniques and pro-environmental attitudes concerning greenhouse gas emissions and change in environmental performance indicators suited to Guwahati city is yet to be examined to date. A healthy and clean environment always depends on safe disposal of plastic waste and its economic behavior along with motivation (financial motivators) for increasing waste handling and management skills.

Most of the recent review articles (Changkakoti D., 2018; Sarma M., 2017) have cogitated on the awareness and knowledge of waste management activities among the citizen of Guwahati. Though most of these thoughts are yet to be re-examined, they draw our attention to new research directions regarding the awareness of recycling behavior, and different waste-handling techniques for environmental issues. The goal of this research is to suggest metamorphic behavioral changes in the human population to be incorporated along with the existing technique of waste handling and management skills to create a sustainable environment. As a result, we formally hypothesized that:

H_1: Change adoption or incorporation in the human population is significantly related to the existing waste handling and management skills of the population.

2. Methodology:

2.1 Site selection and Research design:

The research area was within the municipality area of Guwahati city. The total population of this City was 0.957 million as per the census 2011 and now, the estimated population is nearly 1.155 million as of 2022 (Macrotrends; United Nations). The city is densely populated now. This study is designed to evaluate the incremental value of waste handling and management skills through a design change in the perception of the people of Guwahati city about their motivation (financial motivators) in safe disposal of plastic waste and economic behavior.

2.2 Sample Design:

The total number of samples was calculated using the equation of Mugenda and Mugenda as follows;

$$\mathbf{N} = \frac{\mathbf{Z^2 \times p(1-p)}}{\mathbf{d^2}}$$

Where,

N= Total number of respondents,

Z= Standard normal deviation at required confidence level (i.e. for 99% confidence level Z=2.575)

P= Proportion in the target population=0.5 and

D= Statistical significance level=0.05

Based on the above equation, the minimum required samples were 849. There are six zones under the municipality area of Guwahati city and sixty wards. As the population is more than 10 lakhs, for minimizing time and financial efforts, proportional and stratified simple random sampling methods (Kothari, C. R. 2004) were used to collect samples from six zones of Guwahati city. The questionnaire was prepared in two parts; the first part was based on demographic information and the second part consists of own prepared eight questions exploring plastic waste handling and management skills based on plastic waste disposal behavior, economic behavior during waste handling, and motivation (financial motivators) toward waste management. Each question in the second part was measured using a five-point Likert scale. The questionnaires were handed over to the respondents and collected physically after filling up the same.

3. Result and Analysis:

3.1 Descriptive statistics:

In this study, the male and female respondents were 60% (n=508) and 40% (n=341) respectively, where 77% of the total respondents were less than 45 years old. The educational qualification of respondents was uneducated=9, Preliminary = 14, High school level = 122, and Higher education = 704. The occupation of respondents was as follows; Student = 142, Housewife = 183, Govt employee = 120, Private business = 165, Self-employee= 226, and Retired employee =13 only. The monthly income of respondents was categorized into different income groups and was as follows; 181 respondents earned less than INR15000, 330 earned between INR15001 to 35000, 201earned in between INR35001 to 55000, 56 earned between INR55001 to 75000, 31 earned between INR75001 to 95000, and 50 respondents earned above INR95001.

3.2 Factor Analysis:

Factor analysis was carried out to find out the regression equation and test of hypothesis after determining the strong factor loadings by principal component analysis (PCA) in SPSS. Before extraction of strong factor loadings, it is necessary to check the reliability and validity of variables and their internal consistency. Therefore, Cronbach's Alpha was checked and found 0.670 which showed that the reliability of the questionnaire was moderate and reliable (Daud, 2018). The multicollinearity of variables was checked using SPSS in which the determinant value was found 0.135. Since the determinant score was more than 0.00001, the variables were perfectly correlated and there was no collinearity among the variables considered for factor analysis (Shrestha N., 2021). The result obtained from the multicollinearity test also indicated the non-elimination of any variables in this stage. The data adequacy was checked using KMO and Bartlett's Tests which indicates the good compactness of the pattern of correlation among the variables. KMO value was found 0.699 exceeding the minimum recommended value of 0.5 (Kaiser, 1970; 1974), and indicated us to proceed with factor analysis satisfactorily (Kaiser, 1974; Shrestha N., 2021). Moreover, Bartlett's Test of Sphericity showed the significant value was 0.000 ($p<0.05$) indicating a strong correlation. This significant value (0.000) also provided information about the R matrix which was not an identity matrix, that indicated the existence of sufficient correlation among the variables and was supported to further proceed with the reduction procedure (Howard, M. C., 2016). Again, in the Anti-image matrices test, the diagonal values were found more than 0.5 (Carillo & Ceballos, 2019) which also indicated the adequacy of sampling and permitted for factor analysis and it also indicated the fitness of variables for factor analysis (Shrestha N., 2021).

The communalities test was carried out using the extraction method of PCA to observe the variance of each variable for consideration in factor analysis. The extraction column in the communalities Table 1 shows the common variance against each of the variables. The result depicted that the least value of 30% of the variance associated with variable Q7 is common while the highest value of 77.8% of the variance in variable Q6 is accounted for.

Communalities Table 1

Variables	Initial	Extraction
Q1. motivation (financial motivators) towards improving plastic waste handling system	1	0.775
Q2. Behavior toward the reuse of plastic products	1	0.474
Q3. Recycling behavior for reducing plastic waste.	1	0.774
Q4. Plastic waste disposing behavior in the home	1	0.769
Q5. Economic behavior on safe disposing of plastic waste	1	0.775
Q6. Economic behavior on separation of waste plastic	1	0.778
Q7. Encouraging people towards plastic waste handling	1	0.300
Q8. Perceptible change in plastic waste reduction	1	0.675

Eigenvalues are the indication of the variance explained by that particular factor out of the total variance. The number of components or factors stated by selected variables are identified based on Eigenvalues of more than 1(Braeken, & Van Assen, 2017). Here, it was observed that 3 factors were extracted together to explain the cumulative percentage (66.5%) of the total variance where the value of the first component was 2.599>1, similarly, the value of components 2 and 3 were 1.638 and 1.082 respectively. The total variance explained can be inferred that the first component explains 32.49% variance out of the total variance, the second component 20.476% that was not explained by the first component, and the third component 15.142% that was not explained by the first and second component (Kim & Mueller, 1994; Schmitt, 2011; Hadi et al., 2016a; Fabrigar et al., 1999). So, the 3 components were effective enough in representing all other components or factors highlighted by the 8 stated variables.

The information of variables against each of the 3 components along with their factor loadings was determined by the Component matrix system (Table 2). A factor loading of 0.5 was used to determine the cut-off point for assessing variables of factors (Field A., 2005, Hulya and Aliya 1989; Neill, J. 2008). It had been seen that there was a cross-loading of variables Q2 and Q7. These cross-loadings needed to be eliminated for deriving more adequate results (Costello & Osborne, 2005) and therefore factor loadings were redistributed using a rotational component matrix as shown in table 3 where the number of factors were reduced in which the variables had high loading factors.

Table 2: Component Matrix

Variables	Components		
	1	2	3
Q3. Recycling behavior for reducing plastic waste.	0.860		
Q4. Plastic waste disposing behavior in the home	0.847		

Q8. Perceptible change in plastic waste reduction	0.809		
Q2. Behavior toward the reuse of plastic products	0.605		0.316
Q6. Economic behavior on separation of waste plastic		0.881	
Q5. Economic behavior on safe disposing of plastic waste		0.879	
Q15. Motivation (financial motivators) for improving plastic waste handling system			0.855
Q7. Encouraging people towards plastic waste handling	0.308		0.389

Table 3 explains the component matrix after doing a varimax rotation with the Kaiser Normalization process and using the extraction method of principal component analysis (PCA). Here, the variable (Q2) 'Behavior toward the reuse of plastic products is measured in two components 1 and 3. The value of this variable was below the required value of 0.5 in both the components and could not be considered for further analysis as it was not fit for measuring specific variables (Howard, M. C., 2016; Hulya and Aliya 1989). Moreover, the variable (Q7) 'Encouraging people towards plastic waste handling' bears a loading value of 0.454 in component 3 which is lower than 0.5 and could not be taken for further analysis. Hence, we considered all the variables for regression analysis except the variables 'Behavior towards the reuse of plastic products, and 'Encouraging people towards plastic waste handling.

Table 3: Rotated Component Matrix

Variables	Components		
	1	2	3
Q3. Recycling behavior in reducing plastic waste.	0.876		
Q4. Plastic waste disposing behavior in the home	0.872		
Q8. Perceptible change in plastic waste reduction	0.817		
Q2. Behavior toward the reuse of plastic products	0.490		0.470
Q6. Economic behavior on separation of waste plastic		0.882	
Q5. Economic behavior on safe disposing of plastic waste		0.880	
Q1. Motivation (financial motivators) towards improving plastic waste handling system			0.869
Q7. Encouraging people towards plastic waste handling			0.454

In the rotated component matrix, each of the three components (Factors) measured the variables shown in table 4, where the variables of each factor were interpreted and named against the column of the independent variable (IV) based on the nature of the response. The internal consistency of the variables responding to components 1 and 2 had been checked using Cronbach's alpha and found 0.840 and 0.746 respectively which indicated good internal consistency (Tavakol & Dennick, 2011; Nunnally 1998; Hair & Anderson 1998; King, & Roberts 2002; Awang 2012) among these variables.

Table 4: Name of variables corresponding to each factor along with their factor loading, and internal consistency.

Variables	Factor loading	Cronbach alpha	Factor	Independent variable
Recycling behavior in reducing plastic waste	0.876	0.840	1	Plastic Waste disposal behavior (PWDB)
Plastic waste disposing behavior in the home	0.872			
Perceptible change in plastic waste reduction	0.817			
Economic behavior on separation of waste plastic	0.882	0.746	2	Economic behavior (EB)
Economic behavior on safe disposing of plastic waste	0.880			
Motivation (financial motivators) for improving plastic waste handling system	0.869	-	3	Motivation (Financial Motivators) (M)

The samples distribution of the dependent variable, 'waste handling and management skill' is assumed to be normally distributed as the sample size was enough (N=663) and for this large sample size (N>30), violation of normality assumption does not cause any more problem (Ghasemi & Zahediasl, 2012). Also, the central limit theorem suggests that the mean value of random samples for a large sampling size from any distribution follows a normal distribution level.

After analysis of the Model summary, it was found that the value of R^2 was 0.978 and so, 97.7% of the variance in Waste Handling and Management Skill (dependent variable) was explained by the three independent variables PWDB, EB, and M. This high value of R^2 indicated that the model was good (Meyers et al., 2012). R-value indicated the goodness of fit of the model (Table 5) which was 0.975 and the closer the value of this R the better the model (Yang J. et al., 2020).

3.3 Regression analysis:

Table 5: Goodness of model fit

Model	R	R^2	Adjusted R^2	Standard error of the estimate
1	0.988	0.977	0.977	0.57565

The relationship between the dependent variable and the group of independent variables was tested using the ANOVA test (table 6). The significant value of the group of independent variables was found as 0.000 and since the p-value was less than 0.05 (ie $p<.05$), the group of independent variables was a highly and statistically significant relationship with the dependent variable and reliably predicted the dependent variable. Also, the value of the F ratio (3, 845) = (11853.440) indicated that the regression model was significantly reliable and fit the data (Dhakal, 2018).

Table 6: Reliability and statistically significance of Data

ANOVA[a] Table			
Model 1	Regression	Residual	Total
Sum of Squares	11783.758	280.011	12063.769
Degree of Freedom	3	845	848
Mean Square	3927.919	0.331	
F	11853.440		
Significant Value	0.000[b]		
a. Dependent variable: WHMS b. Independent variable: WB, EB, & Motivation (financial motivators)			

The relationship between each of the three independent variables and the dependent variables was checked for the statistically significant nature of their relationship. In the Coefficients table (Table 7) it had been seen that the significant values of the B-coefficient for all the independent variables and the dependent variable were 0.00 and therefore, the p-value for all the variables was less than 0.05 (i.e., p (0.000) <0.05). this means all the variables were highly and statistically significant.

Table 7: Coefficients [a] Table

Model 1		Constant	Plastic waste disposal behavior (PWDB)	Economic Behavior (EB)	Motivation (financial motivators) (M)
Unstandardized Coefficients	B	2.132	3.245	1.967	1.253
	Standard Error	0.098	0.018	0.038	0.043
Standardized Coefficients	Beta		0.925	0.272	0.153
t value		21.654	176.208	51.771	29.045
Significant level (p-value)		0.000	0.000	0.000	0.000
Collinearity Statistics	Tolerance		0.998	0.997	0.994
	VIEW		1.003	1.003	1.006
a. Dependent variable: WHMS					

3.4 Report: Overall output summary from Regression analysis:

The hypothesis tested if the existing waste handling and management skills of the population of Guwahati city carry a significant impact on change adoption or incorporation in the human population. In the regression analysis, regression of the dependent variable 'waste handling and management skill (WHMS)' was carried out on predicting variables, Plastic waste disposal behavior (PWDB), Economic behavior (EB), and Motivation (financial motivators) (M) for testing hypothesis H_1. The dependent variable was significantly predicted by all the three independent variables, F (3, 845) =11853.440, p=0.000 <0, which implies that there is a significant role of independent variables that

influence the dependent variable WHMS (b=3.245, 1.967, and 1.253, p=0.000). Also, the value of R square (0.977) indicates that 97.7% of the variance in the dependent variable 'WHMS' is explained by the model. The overall summary of results is depicted in table 8.

Table 8: Hypothesis Test

Hypothesis	Regression weight	R square	F	Beta coefficient (b) (Unstandardized)	t value	p-value	Hypothesis
H_1	PWDB ⟹ WHMS	0.977	11853.440	3.245	176.208	0.000	Supported
	EB ⟹ WHMS			1.967	51.771	0.000	
	M ⟹ WHMS			1.253	29.045	0.000	

From the above results, it can be concluded that hypothesis (H_1), "Change adoption or incorporation in the human population is significantly related to the existing waste handling and management skills of the population" is acceptable.

Now the general form of the regression equation to predict Waste handling and management skills (WHMS) can be formed from b-coefficients as follows:

WHMS = 2.132 + 3.245* (PWDB) + 1.967* (EB) + 1.253* (M (financial motivators))

The improvement of waste handling and management skills could be effectively executed by a perceptible change in the human population with regards to their plastic waste disposal behavior, economic behavior, and motivation (financial motivators) towards efficient waste handling mode. Even the above three factors are correlated together. The above-formulated equation conclusively states that every improvement in the plastic waste disposal behavior is going to result in three-point upgradations in the improvement of waste handling and management skills, improvement in economic behavior will result in one-point improvement waste handling and management skills, and motivation (financial motivators) towards efficient waste handling will result in one-point improvement waste handling and management skills, moreover plastic waste disposal behavior, economic behavior and motivation (financial motivators) towards efficient waste handling techniques are highly correlated but slightly positively regressed. So, it can only be construed that perceptible change in waste disposal behavior in waste management techniques should bring in process improvements in waste management techniques and these factors together will improve waste handling and management skills. Though the equation developed in this research suggests that the three factors should be worked upon separately and individually but since the three factors are positively correlated hence, they will be able to affect each other and would be able to optimize the waste handling efforts with the least cost.

3.5 Structural Equation Model (SEM) Analysis:

The SEM was carried out using AMOS for the validity of model fitness and the relationship between the independent variables Waste handling behavior, Economic behavior, and Motivation (financial motivators) obtained from factor analysis and the dependent variables against these factors. The test results depicted in table 9 show that the structural equation model (figure 2) is good-fitted.

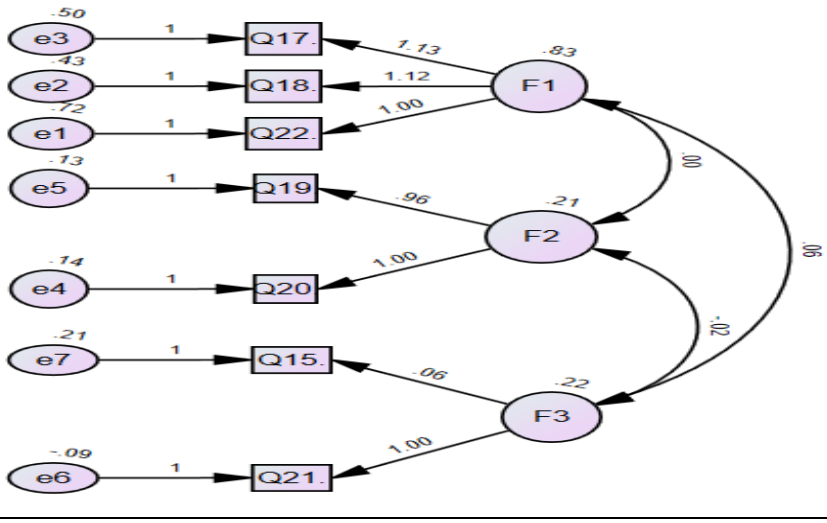

Figure 2: Structural Model

The impact of plastic waste disposal behavior, economic behavior, and motivation (financial motivators) on waste handling and management skills is positive and significant. (b= .0.754, t =22.836, p<0.005), supporting hypothesis H_1.

Table 9: Test report for fitness of Structural Equation Model

Sl No.	Model fit Parameter	Required Value	Model test result	Reference	Remarks
1	CMIN/df	<5	3.129	Hair et al., 2010	Acceptable
2	Goodness-of-fit (GFI) indices	>0.9	0.989	Hair et al., 2010	Acceptable
3	Tucker and Lewis index (TLI)	>0.9	0.970	Tucker and Lewis (1973)	Acceptable
4	Confirmatory fit index (CFI)	>0.9	0.984	Bentler. 1990; Hair et al., 2010	Acceptable
5	standardized root mean square residual (RMR)	<0.05	0.017	(Hair et al., 2010	Acceptable
6	Root mean square error approximation (RMSEA)	Between 0.05 and 0.08	0.05	Hair et al., 2010; MacCallum & Sugawara,1996	Acceptable
7	normal fit index (NFI)	>0.9	0.977	Schermelleh-Engel, K. et al., 2003	Acceptable
8	relative fitness index (RFI) is > 0.9	>0.9	0.956	Hu & Bentler 1999	Acceptable

4. Conclusion:

To find out the criteria for improvement of waste handling and management skills of the people of Guwahati city, this study hypothesized the significant impact on change adoption or incorporation in the human population through three factors, plastic waste disposal behavior, economic behavior, and motivation (financial

motivators) towards efficient waste handling mode after analyzing 849 valid responses from the municipality are of Guwahati City. The model fitness of data ensued and 97.7% of the variance in waste handling and management skills is explained by all regressors. The high significant value (p=0.000) of the three factors, PWDB, EB, and M showed a strong relationship with the improvement of waste handling and management skills. There was no evidence of multicollinearity among the variables, which was checked using correlation coefficients and eigenvalue. The variable on plastic waste disposal behavior is the most significant variable that influences waste handling and management skill. The hypothesis was also tested using the structural equation model and found that the model is significant and fits meeting the required parameters depicted in table 9.

We concluded that efficient waste handling and management skills are necessary for the people of Guwahati city for getting a comfortable environment by reducing the generation of plastic waste. Additionally, depth research is necessary to find out the variables that are responsible for reducing plastic waste for the greater interest of a sustainable environment.

5. Declaration of Competing Interest

The authors declare that they are not aware of any competing financial interests or personal relationships that may have influenced the work presented in this document.

Reference:

1. Afroz, R., Rahman, A., Masud, M. M., & Akhtar, R. (2017). The knowledge, awareness, attitude, and motivation (financial motivators)al analysis of plastic waste and household perspective in Malaysia. Environmental Science and Pollution Research, 24(3), 2304-2315.
2. Swarup R., Mishra S N, and Jauhari V P, · 1992, Introduction To Man And His Environment, Encyclopedia of Ecology, Environment and Pollution Control-1, Land pollution and its control, Mittal Publications, New Delhi, Ist edition 1992, ISBN-81-7099-361-X(vol-1) Book
3. Kumar, S., Smith, S.R., Fowler, G., Velis, C., Kumar, S.J., Arya, S., et al. (2017). Challenges and opportunities associated with waste management in India. R.Soc. Open Sci. 4 (3), 160764. http://dx.doi.org/10.1098/rsos.160764
4. Willis, K., Maureaud, C., Wilcox, C., Hardesty, B.D., (2018). How successful are waste abatement campaigns and government policies at reducing plastic waste in the marine environment? Marine Policy 96, 243–249. https://doi.org/10.1016/j.marpol.2017.11.037
5. Tiseo Ian. (2019). Global data on plastic production and waste 1950-2017, Key information of plastic production and waste globally between 1950 and 2017, https://www.statista.com/statistics/728466/plastic-production-and-waste-worldwide-2017/ (accessed 16th October 2020)
6. CBBC Newsround, What is the problem with plastic? https://www.bbc.co.uk/newsround/42810179. Accessed on 19th December 2020.
7. Vanapalli, K. R., Sharma, H. B., Ranjan, V. P., Samal, B., Bhattacharya, J., Dubey, B. K., & Goel, S. (2021). Challenges and strategies for effective plastic waste management during and post COVID-19 pandemic. Science of The Total Environment, 750, 141514.
8. Benson, N. U., Bassey, D. E., & Palanisami, T. (2021). COVID pollution: impact of COVID-19 pandemic on the global plastic waste footprint. Heliyon, 7(2), e06343.
9. Geyer, R. (2020). Production, use, and the fate of synthetic polymers. In Plastic

waste and recycling (pp. 13-32). Academic Press. Societal Issues, Prevention, and Solutions; Letcher, T., Ed.; London, UK, 2020; pp. 13–30.

10. Geyer, R., Jambeck, J. R., & Law, K. L. (2017). Production, use, and the fate of all plastics ever made. Science advances, 3(7), e1700782.
11. Ellen MacArthur Foundation. (2017). The New Plastics Economy: Rethinking the future of plastics & catalyzing action.
12. Tencati, A., Pogutz, S., Moda, B., Brambilla, M., & Cacia, C. (2016). Prevention policies addressing packaging and packaging waste: Some emerging trends. Waste management, 56, 35-45. https://doi.org/10.1016/j.wasman.2016.06.025
13. Barnes, D. K., Galgani, F., Thompson, R. C., & Barlaz, M. (2009). Accumulation and fragmentation of plastic debris in global environments. Philosophical transactions of the royal society B: biological sciences, 364(1526), 1985-1998.
14. Jambeck, J. R., Geyer, R., Wilcox, C., Siegler, T. R., Perryman, M., Andrady, A., ... & Law, K. L. (2015). Plastic waste inputs from land into the ocean. Science, 347(6223), 768-771. DOI: 10.1126/science.1260352
15. WHO, Health risk associated with stagnant water; Recommendations for Occupational Health and Safety Following Disasters. World Health Organization. file:///C:/Users/user/Downloads/health-risks-associated-with-stagnant-water-wpro-who-int.pdf accessed on 23rd May 2021.
16. Wikipedia, the free encyclopedia, Water stagnation, https://en.wikipedia.org/wiki/Water_stagnation, accessed on 23rd Sept 2022
17. Ling Fangqiong, Whitaker Rachel, LeChevallier Mark W., Liu, Wen-Tso, 2018 "Drinking water microbiome assembly induced by water stagnation". The ISME Journal. 12 (6): 1520–1531, 2018, doi:10.1038/s41396-018-0101-5. ISSN 1751-7362.
18. AIR 1997 SC 1071, Animal and Environment Legal Defense Fund v. Association of India.
19. US Environmental Protection Agency (2012) Wastes: resource conservation-reuse, recycle [Internet]. Retrieved from http://www.epa.gov/waste/conserve/rrr/recycle.htm [assessed: 08.09.2022].
20. Moh, Y. C., & Abd Manaf, L. (2014). Overview of household solid waste recycling policy status and challenges in Malaysia. Resources, Conservation and Recycling, 82, 50-61.\
21. Delistavrou A, Tilikidou I, Sarmaniotis C (2005) The role of motivation (financial motivators) in the consumers' recycling behavior
22. Tilikidou, I. (2001). Ecologically conscious consumer behavior: a research project conducted in Thessaloniki, Greece (Doctoral dissertation, University of Sunderland).
23. Delistavrou, A. (1999). Consumers' recycling behavior in Thessaloniki, Greece. Unpublished MSc dissertation, University of Stirling, Scotland.
24. Masud, M. M., Akhtar, R., Afroz, R., Al-Amin, A. Q., & Kari, F. B. (2015). Pro-environmental behavior and public understanding of climate change. Mitigation and Adaptation Strategies for Global Change, 20(4), 591-600. DOI 10.1007/s11027-013-9509-4
25. Pew Global Attitudes Project (2006) No global warming alarm in the US. The Pew Research Center for the People and Press, Washington D.C.

26. Changkokoti d., 2018. Public participation in combating environmental problems in Guwahati city with special reference to Pandu colony. Indian journal of research. Volume-7, issue-3, print ISSN no 2250-1991
27. SARMA, M., 2017. Environmental education for sustainable development: a study conducted in the schools of greater Guwahati, Assam. ISSN (P): 2249-6866; ISSN (E): 2249-7978 Vol. 7, Issue 4, Aug 2017, 9-14 © TJPRC Pvt. Ltd.
28. Metrotrend. Gauhati, India Metro Area Population 1950-2022. https://www.macrotrends.net/cities/21261/gauhati/population. Retrieved on 13th Sept2022.
29. United Nations. World population prospects 2022. Department of Economic and Social AffairsPopulation Division. https://population.un.org/. Retrieved on 13th Sept2022.
30. Mugenda, O.M & Mugenda. A.G (1999). Research methods. quantitative and qualitative approaches. (pp. 46 - 48). Nairobi, Kenya: ACTS Press.
31. Kothari, C. R. (2004). Research methodology: Methods and techniques. New Age International.
32. Daud, K. A. M., Khidzir, N. Z., Ismail, A. R., & Abdullah, F. A. (2018). Validity and reliability of an instrument to measure social media skills among small and medium entrepreneurs at Pengkalan Datu River. International Journal of Development and sustainability, 7(3), 1026-1037.
33. Kaiser, H. (1970). A second-generation Little Jiffy. Psychometrika, 35, 401-15.
34. Kaiser, H. (1974). An index of factorial simplicity. Psychometrika, 39, 31-36.
35. Shrestha, N. (2021). Factor analysis as a tool for survey analysis. American Journal of Applied Mathematics and Statistics, 9(1), 4-11.
36. Carillo, M. F., Largo, F. F., & Ceballos, R. F. (2019). Principal Component Analysis on the Philippine Health Data. arXiv preprint arXiv:1902.07905.
37. Braeken, J., & Van Assen, M. A. (2017). An empirical Kaiser criterion. Psychological Methods, 22(3), 450.
38. Kim, J., & Mueller, C. W. (1994). Factor Analysis: Statistical Methods and Practical Issues. In M. S. Lewis-Beck (Ed.), Factor Analysis and Related Techniques. International Handbooks of Quantitative Applications in the Social Sciences. Sage Publications.
39. Schmitt, T. A. (2011). Current methodological considerations in exploratory and confirmatory factor analysis. Journal of Psychoeducational Assessment, 29(4), 304-321.
40. Hadi, N. U., Abdullah, N., & Sentosa, I. (2016a). An Easy Approach to Exploratory Factor Analysis; Marketing Perspective. Journal of Educational and Social Research, 6(1),215-223. http://dx.doi.org/10.5901/jesr.2016.v6n1p215
41. Fabrigar, l. R., Wegener, D. T., MacCallum, R. C., & Strahan, E. J. (1999). Evaluating the use of exploratory factor analysis in psychological research. Psychological Methods,4(3), 272-299. http://dx.doi.org/10.1037/1082-989XA3.272.
42. Field, A. (2005). C8057 (Research Methods II): Factor Analysis on SPSS. https://users.sussex.ac.uk/~andyf/factor.pdf. Retrieved on 30th July 2022
43. Costello, A.B., & Osborne, J.W. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. Practical Assessment, Research, and Evaluation, 10(7), 1-9.

44. Neill, J. (2008). Writing up a factor analysis. Retrieved September 7, 2008.
45. Howard, M. C. (2016). A review of exploratory factor analysis decisions and overview of current practices: What we are doing and how can we improve? International Journal of Human-Computer Interaction, 32(1), 51-62.
46. Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. International journal of medical education, 2, 53.
47. Nunally, J. C. (1978). Psychometric Theory, 2" ed. New York: McGraw-Hill.
48. Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). Factor analysis. Multivariate data analysis. NJ Prentice-Hall, 3, 98-99.
49. King, J. T., & Roberts, M. S. (2002). Validity and reliability of the Short Form—36 in cervical spondylotic myelopathy. Journal of Neurosurgery: Spine, 97(2), 180-185.
50. Awang, Z. (2012). Structural equation modeling using AMOS graphic. Penerbit Universiti Teknologi MARA.
51. Ghasemi, A., & Zahediasl, S. (2012). Normality tests for statistical analysis: a guide for non-statisticians. International journal of endocrinology and metabolism, 10(2), 486.
52. Meyers, L. S., Gamst, G., & Guarino, A. J. (2012). Multiple regression: statistical methods using IBM SPSS. Applied multivariate research: design and interpretation. 2nd ed. Thousand Oaks (CA): Sage, 1104.
53. Yang, J., Zhang, L., Wang, W., & Qiu, Z. (2020, November). A Regression Analysis on the Effects of Factors on Plastic Waste Production. In IOP Conference Series: Earth and Environmental Science (Vol. 603, No. 1, p. 012013). IOP Publishing.
54. Dhakal, C. P. (2018). Interpreting the basic outputs (SPSS) of multiple linear regression. International Journal of Science and Research (IJSR), 8(6), 1448-1452.
55. Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. Structural equation modeling: a multidisciplinary journal, 6(1), 1-55.
56. Schermelleh-Engel, K., Moosbrugger, H., & Müller, H. (2003). Evaluating the fit of structural equation models: Tests of significance and descriptive goodness-of-fit measures. Methods of psychological research online, 8(2), 23-74.
57. MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. Psychological methods, 1(2), 130.
58. Tucker, L. R., & Lewis, C. (1973). A reliability coefficient for maximum likelihood factor analysis. Psychometrika, 38(1), 1-10.
59. Bentler, P. M. (1990). Comparative fit indexes in structural models. Psychological Bulletin, 107(2), 238.
60. Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). Canonical correlation: A supplement to multivariate data analysis. Multivariate Data Analysis: A Global Perspective, 7th ed.; Pearson Prentice Hall Publishing: Upper Saddle River, NJ, USA.