Orissa Journal of Commerce
Vol. 43, Issue 2, April-June 2022
ISSN: 0974-8482

URL: www.ojcoca.org
DOI: https://doi.org/10.54063/ojc.2022.v43i02.03

Practices and Challenges of Household Plastic Waste Disposal: An Evaluation of Waste Management System in Kerala

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To cite this paper

Benny, V. (2022). Practices and Challenges of Household Plastic Waste Disposal: An Evaluation of Waste Management System in Kerala. *Orissa Journal of Commerce*. 43(2), 27-44.

Keywords

Plastic waste management, Disposal practices, Plastic waste, Plastic recycling, Households challenges

JEL Classification
H7, H12, Q52, Q53, Q57

Abstract: Plastic Waste Management (PWM) is a significant challenge in every region for local governments / legislatures in emerging nations. Local bodies are facing with the restricted financial policies and deterrents with the assortment of waste, absence of legitimate machinery, use of technology, and sporadic collection by agencies. These snags lead to additional issues, such as littering and illicit unloading in remote and rural regions especially in Kerala. This research attempts to identify the PWM practices by the government on household plastic disposal practices and challenges, by analyzing the study conducted in 203 sample units of households in Kerala. The structured equation modeling technique is used to measure the effectiveness of programme developed by the government to manage households' plastic disposal practices and challenges. The findings of this study are that the Government of Kerala should invest in effective waste management practices in each district and should try to reduce plastic waste by adapting innovative measures and encouraging sustainable plastic waste management technologies at regional level.

1. Introduction

Plastic Waste Management (PWM) in rustic and distant regions poses significant challenges for local administration of growing nations. The PWM financial plan of local government is restricted and, surprisingly, more so in rustic and remote regions. Panchayath and Municipalities in such regions ordinarily face deterrents with the assortment of waste. They also face lack of proper waste management equipment, technologies and effective plastic waste treatment centers and experience hardships getting to a treatment center somewhere else (Hidalgo *et al.*, 2017). The inconsistent dissemination of infrastructure in Kerala on PWM is also a worry and originates from the political-financial disparities of the governments in past period. These impediments contribute to different issues, such as littering and unlawful waste dumping.

Household plastic waste is produced through household movements like single-use of disposable plastic materials, choosing synthetic clothing fibers (cotton) and carrying plastic bags for shopping and plastic toys. It also consists of used plastic products or materials, including plastic chairs, plastic flower vases, plastic glasses, and old plastic sandals (Reddy, 2011). Most of the plastic items used by the households are single-use plastic without recycled content, which includes plastic containers, buckets, bins and plastic furniture. Therefore, the main objective of the Government of Kerala in plastic waste management is to transition of open dumping-based waste practices to recycle -based waste management practices. This technique encourages the reduction in plastic waste and also ensures effective waste management practice in local regions in Kerala.

PWM is emphatically impacted by the legitimate treatment of waste at the household level. It is the obligation of the local government as well as that of families or households. Most of the previous researches in the field of plastic disposal practices of households and waste management of households are done mainly outside Kerala. As per the recent report published by the Central Pollution Control Board of India, Kerala holds the third position for the highest per capita plastic waste generation after Delhi and Goa (https://cpcb.nic.in/). In this scenario, it is highly important to conduct a study to obtain information related to the plastic waste management practices and challenges in Kerala. The present study tries to investigate the household disposal practices and challenges of the plastic waste system, and also evaluate the effectiveness of measures undertaken by the government to reduce plastic consumption in the state of Kerala.

2. Review of Literature and Conceptual Framework

2.1. Review of Literature

Adane and Muleta (2011) looked into the environmental effects of using plastic bags and disposing of them in Ethiopia's Jimma City. They have found that due to easy availability and low cost, plastic bags were used more than any other plastic product by households. Despite households' perception of the negative effects of plastic-house-related items, the use of plastic bags has increased from time to time. Costs (2013) found that plastic is the most widely used product on the planet. In his study on plastic effects on households, and he found out that plastic's lifecycle effects, taken together, paint a simple and disturbing image of how the substance endangers human health on a global scale. Therefore, stopping and reversing the growth of plastics production is required to reduce these threats. Along with the proper waste management systems are essential for controlling plastic waste. Dangi *et al.* (2011) studied plastic waste generation to address waste management issues in Kathmandu Metropolitan City (KMC), Nepal. They have concluded that composting has a greater potential for recovering organic waste and thereby addressing waste management problems.

The household's plastic disposal practice in an inexpensive way is essential for reducing plastic waste. Gwada *et al.* (2019) states that the proper disposal methods of plastic waste are required for both being eco-friendly and should be adaptable to the recycling process. Hage *et al.* (2018) surveyed to see how municipal waste management strategies, geographical conditions and socioeconomic factors affected plastic collection rates. They have found that plastic packaging and waste collection would operate in a spatially inexpensive manner.

Hidayat *et al.* (2019) found the best way to minimize the accumulation of plastic waste in Indonesia is by developing a sustainable framework for handling household plastic waste across the country by recycling and reusing it in an eco-friendly manner. Jambeck *et al.* (2018) research on land-based and marine waste management would provide an opportunity for job creation, poverty reduction, clean-up efforts, local environmental stewardship and tourism growth. Reducing plastic waste helps to reduce the spread of diseases and avoid flooding, particularly in urban areas.

Li *et al.* (2009) found that biodegradable plastics have a bright future ahead of them and that plastic waste can be reduced by using less harmful substitutes such as paper. Maskey and Singh (2017) found that household's education and income have a significant effect on waste generation, and these variables are statistically significant at one per cent level of significance and thus can be useful measures for forecasting the trend in solid waste generation. Miezah *et al.* (2015) conducted a study in Ghana, and found that Ghana generates twelve thousand seven hundred and ten tons of plastic waste per day per its current population of twenty-seven lakh people and the organic fraction in plastic waste is the highest in the waste stream, ranging from forty-eight to sixty nine per cent.

Olusunmade (2019) analyzed how plastic waste is separated and disposed of, as well as public awareness of the harmful effects of plastic waste on the environment. The researcher stresses the importance of implementing a constructive and long-term management strategy involving people, companies, hospital administrations and waste management bodies to protect the environment, as well as proper plastic waste separation from other solid waste.

Proshad *et al.* (2017) concluded that irritation of the eyes, vision loss, breathing difficulties, respiratory disorders, liver dysfunction, and gastrointestinal problems are all related to the use of toxic plastics. Plastics pollute the atmosphere in a variety of ways, including soil, water and air pollution. Therefore, the local governments take necessary steps to reduce the usage of plastic and plastic waste. Quartey *et al.* (2015) conducted a study to investigate the effects of plastic waste and the need for successful environmental management in Ghana. The researcher discovered that developed countries' lack of sustainable solid waste management was a major contributor to climate change and greenhouse gas emissions. Siddiqui and Pandey (2013) found that the current pace of environmental degradation is likely to continue degrading the ecosystem, so it is preferable to take long-term remedial steps to protect the environment. Ssemugabo *et al.* (2020) found that solid waste management in slum communities is generally weak and that a series of initiatives are needed to resolve the physical and behavioural aspects of solid waste management.

Visvanathan (2018) in his study found that plastic waste management has assumed great importance as a result of urbanization activities, according to data released by various state governments in India. To avoid health hazards, plastic waste produced by polymer manufacturers at the manufacturing, extrusion, quality control and lab testing stages, as well as by consumers, must be disposed of and recycled as soon as possible. Yintii *et al.* (2014), based on their report, plastic waste is usually thrown along with other household waste. The study discovered that waste was handled at the household level by mothers and children, with most fathers or grown-up men taking no active role in waste management. Yoada *et al.* (2014) found that sixty one per cent of households used neighborhood bins to dispose of their trash. The remaining 39 per cent dumped their trash in gutters, sidewalks, holes and bushes nearby. To regulate excessive waste disposal, the study recommended proper public education government measures, the provision of more shared trash cans and the collection of waste by private contractors are essential for the future.

Okunola *et al.* (2019) also found that plastic production and waste disposal activities cause numerous issues in almost every region, as evidenced by the detrimental consequences on human health and the environment when it's not properly handled. Similarly, Ssemugabo *et al.* (2020) point out that inadequate research is carried out among households, which plays an important role in the management of plastic waste. Nxumalo *et al.* (2020) mentioned that most households are following the conventional method of plastic waste disposal and face many challenges in the disposal of household plastic waste. Proshad *et al.* (2017) argued that inappropriate management of plastic waste poses a threat to public health, societal well-being and wildlife. Plastic waste is accumulating and being poorly treated all over the world. Even so, it's become a major global problem. Li *et al.* (2009) found out that roads, waterways and other open spaces are often littered with waste piles, posing serious health and environmental risks. It is important to take appropriate steps to monitor plastic waste use and its consequences.

Most of the studies based on household disposal practices and challenges were conducted outside Kerala. Due to this lack of comprehensive research in this field, the researcher decided to investigate households' plastic disposal practices and challenges in Kerala. As a result, by comprehending the importance and broad scope of research on household plastic waste disposal practices and challenges, we have studied this topic, and the study also aims to provide insight into the plastic waste management system in Kerala.

2.2. Conceptual Framework

Based on literatures, a conceptual framework is applied to measure the effectiveness of policies taken by the government based on plastic disposal practices and challenges of households. The conceptual framework is summarized as three segments, such as Households Plastic Waste Disposal Practices (HPWDP), Households Plastic Waste Challenges (HPWC) and Measures taken by the Government to reduce Plastic Waste (GM).

Miezah *et al.* (2015) specified that the household plastic waste disposal practices involve open dumping (HPWDP 1), burying (HPWDP 2), burning (HPWDP 3), land filling (HPWDP 4), and giving to collection agencies (HPWDP 5). Kofoworola (2007) mentioned that the difficulties (plastic waste challenges) faced in disposing of plastic waste include a lack of knowledge (HPWC 1), the lack of dumping sites (HPWC 2), irregular collection by agencies (HPWC 3), the lack of dustbins (HPWC 4), and the lack of plastic waste acceptance in the market (HPWC 5). Due to these plastic waste disposal practices and plastic waste challenges, the government has taken certain measures to reduce plastic waste. Aleluia and Ferrao (2016) mentioned that the plastic waste management approach of the government includes an awareness programme (GM 1), effective waste management practices (GM 2), promotion of 5'R's (GM 3), providing reusable bags and pouches (GM 4), and effective recycling of plastic materials to develop other products (GM 5). In the present scenario, the different types of plastic waste generated by households vary according to monetary conditions, seasons, as well as the demographic segment and location of the areas (Birhanu and Berisa, 2015). In order to develop an appropriate framework, to measure the effectiveness of a programme developed by the government, the researcher used the Ferrara (2008) model as an initial theoretical framework for this study. This model explains the detailed elements involving disposal practices and challenges faced by households with plastic waste. Finally, the researcher has built an effective model with interconnected variables such as plastic disposal practices and challenges, along with measures taken by the government to reduce plastic waste. The conceptual model used for this study is described in figure 1.

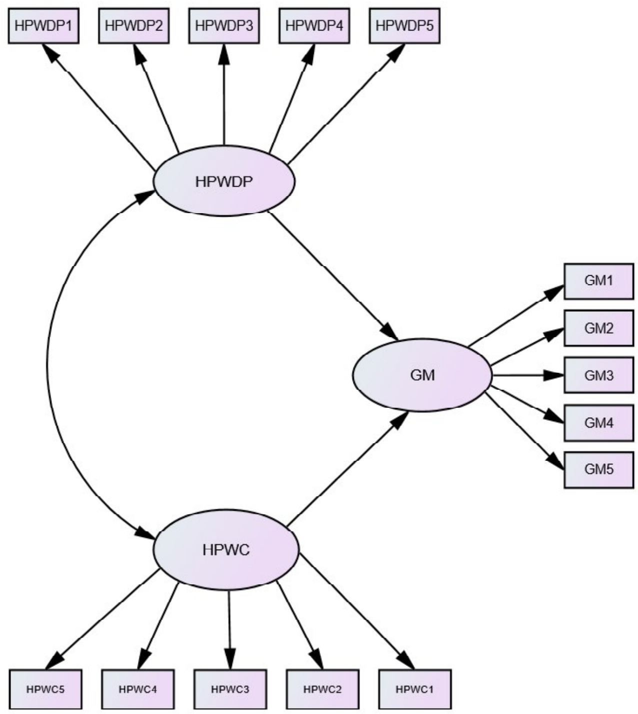

Figure 1: Conceptual Model

Source: Author's Own Conceptualization

3. Objectives of the Study

- To find out the household disposal practices and challenges of the plastic waste management system in Kerala.
- To evaluate the effectiveness of measures taken by the government to reduce plastic waste disposal practices and challenges for households.

4. Methodology

The area of the research is confined to Kerala. Therefore, the Pollution Index of each district in Kerala was used to frame the population for the study. Based on the range of the Pollution Index, the fourteen districts are divided into three categories i.e., least polluted, moderately polluted and heavily polluted. Table 1 depicts the district with Kerala's pollution index.

Table 1: District Wise-Pollution Index of Kerala

Range of Pollution Index (in Percent)	*Districts*	*Pollution Index*	*Inference*
20 -50	Pathanamthitta	47.99	Least Pollution
	Mallappuram	44.24	
	Idduki	37.02	
50 -75	Thrissur	72.89	Moderate Pollution
	Kollam	72.26	
	Wayanad	67.03	
	Ernakulum	66.87	
	Kottayam	63.04	
	Kozhikode	61.51	
	Kannur	54.08	
75 -100	Thiruvanathapuram	87.84	Heavily Pollution
	Allapuzha	81.64	
	Palakkad	78.34	
	Kasargode	76.09	

Source: Author's Own Compilation

The samples are collected using the Multi-Stage Sampling technique. In the first stage, the pollution index of each district in the strata varies according to their size. Therefore, one sample district is selected from each strata through the Lahiri method under probability proportionate size sampling techniques. As per the Lahiri method, Malappuram district is chosen from the least polluted area, Ernakulum district is chosen from the moderate polluted area and Alappuzha district is chosen from the heavily polluted area.

In the second stage, the researcher used proportional allocation of stratified sampling technique for the selection of households. The proportion has been decided with the help of the human population in each district. Table 2 shows the human population of these three districts of Kerala.

Table 2: District Wise Human Population of Kerala

District	*Population (In Lakhs)*
Alappuzha	21.28
Ernakulum	32.82
Malappuram	41.13

Source: Author's Own Compilation

In this study, the appropriate number of samples turned out to be 203, which were confirmed using the sample size determination technique, and the proportion for sample selection is 21:33:41

from each district (based on human population in Table 2). Therefore, the total sample units are divided on the basis of this proportion.

In the final stage, 45 households from Alappuzha district, 71 households from Ernakulum district and 87 households from Malappuram district were selected through purposive sampling techniques.

5. Data Analysis and Interpretation

5.1. Profile of Households

Table 3: Demographic Profile of Households

Gender wise Classification of Households		
Gender	*Number of Households*	*Percent*
Male	61	30.05
Female	142	69.95
Total	203	100
Age wise Classification of Households		
Age	*Number of Households*	*Percent*
Below 20	41	20.20
20 – 40	70	34.48
40 – 60	48	23.65
Above 60	44	21.67
Total	203	100
Education wise Classification of Households		
Education	*Number of Households*	*Percent*
High School	45	22.17
Higher Secondary	40	19.70
Graduation	72	35.46
Post-Graduation	46	22.67
Total	203	100

Source: Author's Own Compilation

Table 3 shows the demographic profile of households. Out of 203, they were represented by 61 males (30.05%) and by 142 females (69.95%). As per the age level, 41 respondents (20.20%) were below 20 years, followed by 20 – 40 years (34.48%), 40 – 60 years (23.65%) and there were 44 respondents at the age of above 60 (21.67%). In terms of education level, 45 respondents were high school level

(22.17%), 40 respondents were higher secondary level (19.70%), 72 respondents were graduation level (35.46%) and 46 respondents were post-graduation level (22.67%).

5.2. Analysis on Measures taken by the Government to Reduce Plastic Waste based on HPWDP and HPWC

Table 4: Correlation between Household's Plastic Waste Disposal Practices with Demographical Factors

Variables		*Households Plastic Waste Disposal Practices (HPWDP)*				
		Open Dumping (HPWDP 1)	*Burying (HPWDP 2)*	*Burning (HPWDP 3)*	*Land filling (HPWDP 4)*	*Giving to Collection Agencies (HPWDP 5)*
Gender	Pearson Correlation	.593**	.573*	.673*	.821*	.893**
	p – value	.001	.011	.013	.013	.001
Age	Pearson Correlation	.623**	.728*	.673*	.823*	.478**
	p – value	.001	.013	.014	.017	.001
Education	Pearson Correlation	.342**	.343*	.627**	.777**	.877**
	p – value	.001	.015	.007	.007	.006

** 1% level of significance (.01)

* 5% level of significance (.05)

Source: Author's Own Compilation

The relationships between plastic waste disposal practices of households with demographical factors are expressed in Table 4. The Pearson correlation coefficient is used to determine how strongly these two variables are related. Table 4 shows that all the variables are positively correlated to demographical variables and p-values are statistically significant. So it can be concluded that there is a significant relationship between household plastic waste disposal practices with respect to demographic variables.

The p-values of the variables related to household plastic waste disposal practices with respect to demographic variables are less than .05 (Table 5). The results indicate that the disposal practices are dependent on their gender, age and education. Cramer's statistics are used to measure the strength of the relationship between household disposal practices and demographic variables. Here, the entire values are greater than .35. It indicates that there is a strong relationship between household plastic waste disposal practices and demographic factors.

The relationships between plastic waste challenges of households with respect to demographical factors are shown in Table 6. The Karl Pearson correlation coefficient is used to determine how strongly these two variables are related. Table 6 shows that all the variables are positively related to demographical variables and p-values are statistically significant. So it can be concluded that there is a

Table 5: Chi-square Test on Household's Plastic Waste Disposal Practices with Respect to Demographical Factors

Variables		*Households Plastic Waste Disposal Practices (HPWDP)*				
		Open Dumping (HPWDP 1)	*Burying (HPWDP 2)*	*Burning (HPWDP 3)*	*Land filling (HPWDP 4)*	*Giving to Collection Agencies (HPWDP 5)*
Gender	Chi-Square Statistic	121.32	118.64	56.34	78.45	117.28
	p – value significance	.001	.011	.013	.013	.001
	Cramer's Statistic	.352	.363	.361	.351	.353
Age	Chi-Square Statistic	98.46	122.45	121.78	58.67	115.47
	p – value significance	.001	.013	.014	.017	.001
	Cramer's Statistic	.362	.374	.358	.360	.362
Education	Chi-Square Statistic	131.56	120.43	118.78	119.37	90.56
	p – value significance	.011	.015	.007	.007	.006
	Cramer's Statistic	.352	.363	.361	.351	.353

Notes: 1. *p- value < .05, which indicate that variable are statistically significant at the .05 level.*

2. Cramer's Statistic above .35 would be considered as "strong relationship"; value between .25 and .35 would be considered as "moderately strong relationship" and below .25 would be considered as "no relationship".

Source: Author's Own Compilation

Table 6: Correlation between Households Plastic Waste Challenges with Demographical Factors

Variables		*Households Plastic Waste Challenges (HPWC)*				
		Lack of knowledge (HPWC 1)	*Lack of dumping sites (HPWC 2)*	*Irregular collection by agencies (HPWC 3)*	*Lack of dustbins (HPWC 4)*	*Lack of plastic waste acceptance in the market (HPWC 5)*
Gender	Pearson Correlation	.745**	.613*	.589**	.718*	.276**
	p – value	.000	.017	.003	.016	.000
Age	Pearson Correlation	.356*	.765**	.565**	.586**	.653**
	p – value	.011	.003	.004	.007	.000
Education	Pearson Correlation	.421**	.467*	.645**	.321**	.659**
	p – value	.000	.021	.003	.001	.001

** 1% level of significance (.01)

* 5% level of significance (.05)

Source: Author's Own Compilation

significant relationship between household plastic waste challenges with respect to their demographic variables.

Table 7: Chi-square test on Households' Plastic Waste Challenges with Respect to Demographical Factors

Variables		*Households Plastic Waste Challenges (HPWC)*				
		Lack of knowledge (HPWC 1)	*Lack of dumping sites (HPWC 2)*	*Irregular collection by agencies (HPWC 3)*	*Lack of dustbins (HPWC 4)*	*Lack of plastic waste acceptance in the market (HPWC 5)*
Gender	Chi-Square Statistic	96.72	119.45	72.34	62.45	132.45
	p – value significance	.001	.000	.004	.007	.011
	Cramer's Statistic	.357	.353	.358	.353	.360
Age	Chi-Square Statistic	130.78	78.45	124.75	129.45	94.49
	p – value significance	.000	.021	.000	.002	.003
	Cramer's Statistic	.371	.368	.373	.362	.351
Education	Chi-Square Statistic	79.15	67.68	89.82	132.45	130.01
	p – value significance	.011	.015	.009	.010	.003
	Cramer's Statistic	.354	.353	.371	.356	.356

Notes: 1. *p- value < .05, which indicate that variable are statistically significant at the .05 level.*

2. Cramer's Statistic above .35 would be considered as "strong relationship"; value between .25 and .35 would be considered as "moderately strong relationship" and below.25 would be considered as "no relationship".

Source: Author's Own Compilation

The chi-square test is conducted to find out the association between categorized variables. The p-values of all the variables related to household challenges with respect to demographic variables are less than .05 (Table 7). So it can be concluded that the variables are statistically significant at a 5 per cent level of significance. As these results indicate, household challenges are dependent on their gender, age and education. Cramer's statistics are used to measure the strength of relationships between household challenges and demographic variables. Here, the entire values are greater than .35. It indicates that there is a strong relationship between plastic waste challenges and demographic factors.

The relationships between measures taken by the government to reduce plastic waste based on HPWDP and HPWC are shown in Table 8. The Pearson correlation coefficient is used to determine how strongly these two variables are related. Table 8 shows that all the variables are positively correlated to HPWDP and HPWC, and p-values are statistically significant. So it can be concluded that there is a significant relationship between government measures with respect to HPWDP and HPWC.

Table 8: Correlation between Measures taken by the Government to Reduce Plastic Waste based on HPWDP and HPWC

Variables		*Measures taken by the Government (GM)*				
		Raising Awareness on plastic pollution (GM 1)	*Effective Waste Management (GM 2)*	*Promoting the 5'Rs- (GM 3)*	*Providing reusable bags and pouches (GM 4)*	*Effective Recycling of plastic materials to develop other products (GM 5)*
HPWDP	Pearson Correlation	.623**	.613**	.522*	.141*	.301**
	p – value	.005	.001	.014	.003	.000
HPWC	Pearson Correlation	.657**	.617*	.322*	.207**	.489**
	p – value	.000	.023	.016	.007	.003

** 1% level of significance (.01)

* 5% level of significance (.05)

Source: Author's Own Compilation

Table 9: Chi-square test on Measures taken by the Government to Reduce Plastic Waste based on HPWDP and HPWC

Variables		*Measures taken by the Government (GM)*				
		Raising awareness on plastic pollution (GM 1)	*Effective Waste Management (GM 2)*	*Promoting the 5'Rs- (GM 3)*	*Providing reusable bags and pouches (GM 4)*	*Effective Recycling of plastic materials to develop other products (GM 5)*
HPWDP	Chi-Square Statistic	92.42	142.34	132.38	79.67	145.89
	p – value significance	.016	.009	.008	.014	.003
	Cramer's Statistic	.362	.373	.421	.420	.410
HPWC	Chi-Square Statistic	89.34	109.21	138.78	112.11	111.44
	p – value significance	.012	.002	.007	.013	.011
	Cramer's Statistic	.382	.411	.398	.374	.364

Notes: 1. *p- value< .05, which indicate that variable are statistically significant at the .05 level.*

2. Cramer's Statistic above .35 would be considered as "strong relationship"; value between .25 and .35 would be considered as "moderately strong relationship" and below .25 would be considered as "no relationship".

Source: Author's Own Compilation

The chi-square test is conducted to find out the association between categorized variables. The p-values of all the variables related to measures taken by the government to reduce plastic waste based on HPWDP and HPWC are less than .05 (Table 9). So it is concluded that there is an association between government measures based on HPWDP and HPWC. Therefore, the measures taken by the government to reduce plastic waste are dependent on HPWDP and HPWC. Cramer's statistics are used to measure the strength of the relationship between government measures and HPWDP & HPWC. Here, the entire values are greater than .35. It indicates that there is a strong relationship between government measures and HPWDP & HPWC.

6. Results and Discussion

6.1. Model Validity

Model validity is advocated and administered to affirm "construct validity" for dimensions related to Measures taken by the Government to reduce Plastic Waste (GM) based on Households Plastic Waste Disposal Practices (HPWDP) and Households Plastic Waste Challenges (HPWC), which will set the ground for examining the relationship between construct dimensions and their items (Figure 2). The values establish the model fitness for the data specified in Table 10.

Table 10: Model Fit Indices

Model Fit Indices	*Citations*	*Threshold Limit*	*Estimated Value*	*Interpretation*
Normed Chi-Square	Kline, R.B. (2005)	< 3	225.776/ 87 CMIN/DF – 2.595	Excellent
CFI	Kline, R.B (2005)	>.90	0.956	Good
GFI	Kline, R.B (2005)	>.90	0.941	Good
AGFI	Kline, R.B (2005)	>.90	0.932	Good
PGFI	Kline, R.B (2005)	>.90	0.911	Good
TLI	Kline, R.B (2005)	>.90	0.927	Good
IFI	Kline, R.B (2005)	>.90	0.932	Good
NFI	Kline, R.B (2005)	>.90	0.915	Good
RMSEA	Kline, R.B (2005)	< 0.08	0.05	Acceptable
SRMR	Kline, R.B (2005)	< 0.06	0.03	Excellent

Source: Author's Own Compilation

Table 10 reveals the indices of the relevant model. As per the model fit criteria, the ratio of goodness of fit to degrees of freedom should not exceed 3 and RMSEA < 0.08, along with GFI, AGFI, PGFI, TLI IFI, NFI and CFI values being > 0.9. The smaller SRMR indicates a better model fit. The value of RMSEA is < 0.08 and CMIN/DF is < 3, which indicates a good model.

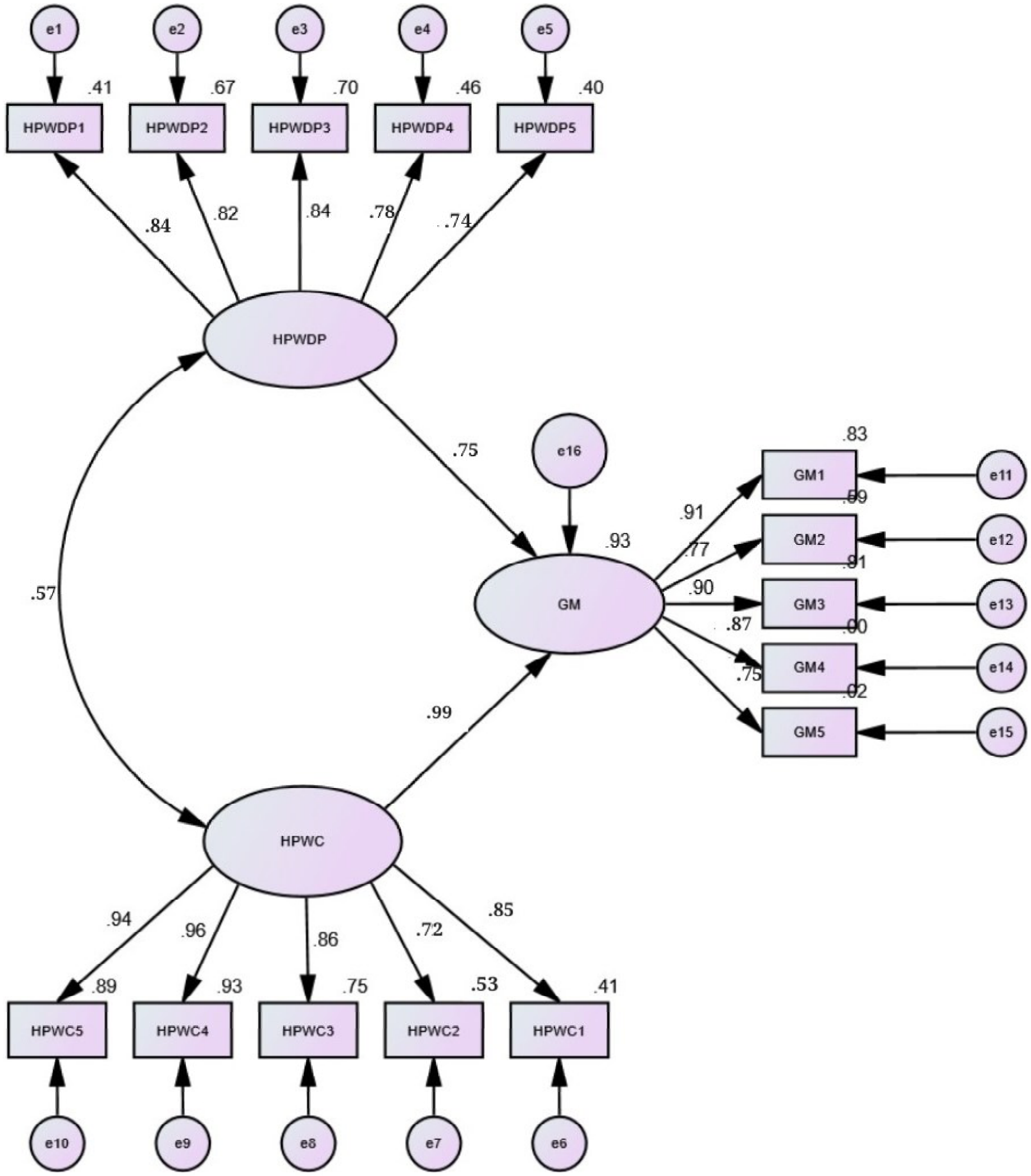

Figure 2: The Conceptual Model Validity

Source: Author's Own Compilation

Table 11: Standardized and Unstandardized Regression Weights of the Model

			Unstandardized Regression Weights				
Indicator	*<—*	*Latent*	*Estimate*	*S.E.*	*Critical Ratio*	*P-value*	*Standardized Regression Weights*
HPWDP1	<—-	HPWDP	1				0.840
HPWDP2	<—-	HPWDP	1.144	0.147	7.777	***	0.821
HPWDP3	<—-	HPWDP	1.250	0.150	8.317	***	0.838
HPWDP4	<—-	HPWDP	1.125	0.165	6.836	***	0.778
HPWDP5	<—-	HPWDP	0.481	0.126	3.805	***	0.736
HPWC1	<—-	HPWC	1				0.850
HPWC2	<—-	HPWC	1.200	0.143	8.391	***	0.717
HPWC3	<—-	HPWC	1.576	0.195	8.100	***	0.865
HPWC4	<—-	HPWC	2.092	0.227	9.224	***	0.965
HPWC5	<—-	HPWC	1.958	0.209	9.368	***	0.942
GM1	<—-	GM	1				0.913
GM2	<—-	GM	0.925	0.086	10.766	***	0.771
GM3	<—-	GM	0.896	0.072	12.408	***	0.899
GM4	<—-	GM	1.075	0.095	11.315	***	0.869
GM5	<—-	GM	1.173	0.092	12.750	***	0.751

Source: Author's Own Compilation

Table 11 shows the standardized and unstandardized regression weights of the Model based on latent and indicator variables. The standardized regression weights of all the latent variables based on indicator variables are greater than 0.5 and p – values are less than .01. It indicates that all indicator variables used to predict latent variables are statistically significant.

Table 12: Composite Reliability of the Model

Latent Variables	*CR*	*AVE*	*MSV*	*MaxR (H)*
HPWC	0.940	0.761	0.326	0.966
HPWDP	0.901	0.646	0.327	0.905
GM	0.924	0.711	0.327	0.938

Source: Author's Own Compilation

The composite reliability of the model is expressed in Table 12. The composite reliability of HPWC is 0.940, HPWDP is 0.901 and GM is 0.924. If CR > 0.70, AVE < CR, and AVE > MSV, which indicates that the model achieved composite reliability.

Table 13: Convergent Validity of the Model

Indicator Variable	*<—-*	*Latent Variable*	*Standardized Loading*	*Square of Standardized Loading*	*Sum of Square of Standardized Loading*	*Number of Indicators*	*AVE*
HPWDP1	<—-	HPWDP	0.840	0.706	3.229	5	0.646
HPWDP2	<—-	HPWDP	0.821	0.674			
HPWDP3	<—-	HPWDP	0.838	0.702			
HPWDP4	<—-	HPWDP	0.778	0.605			
HPWDP5	<—-	HPWDP	0.736	0.542			
HPWC1	<—-	HPWC	0.850	0.723	3.803	5	0.761
HPWC2	<—-	HPWC	0.717	0.514			
HPWC3	<—-	HPWC	0.865	0.748			
HPWC4	<—-	HPWC	0.965	0.931			
HPWC5	<—-	HPWC	0.942	0.887			
GM1	<—-	GM	0.913	0.834	3.555	5	0.711
GM2	<—-	GM	0.771	0.594			
GM3	<—-	GM	0.899	0.808			
GM4	<—-	GM	0.869	0.755			
GM5	<—-	GM	0.751	0.564			

Source: Author's Own Compilation

Table 13 reveals the convergent validity of the model. In order to achieve the convergent validity, the AVE (Average Variance Extracted) must be 0.5 or more than 0.5 and standard factor loadings are greater than 0.50. As per this model, the AVE of HPWDP is 0.646, HPWC is 0.761 and GM is 0.711. The factor loadings of all the latent variables based on indicator variables are greater than 0.5. It indicates that the model achieved convergent validity.

Table 14: Discriminant Validity of the Model

Latent Variables	*HPWC*	*HPWDP*	*GM*
HPWC	0.872		
HPWDP	0.571	0.804	
GM	0.531	0.572	0.843

Source: Author's Own Compilation

The discriminant validity of the model established in Table 14. In order to achieve the discriminant validity, the square root of AVE must be more than latent variables correlations i.e. inter – constructed correlations. As per this model, the square root AVE of HPWC is 0.872, HPWDP is 0.804 and GM 0.843, which are greater than inter – constructed correlations. Therefore, this model satisfies the requirements for discriminant validity.

7. Conclusion

The local bodies like panchayats, municipalities and corporations are playing a vital role in the plastic waste management system of government. Therefore, the whole hearted support of the local bodies is essential to ensure an effective plastic waste management system in Kerala. The household's plastic disposal practices are highly related to their demographic factors such as gender, age and education. When it comes to plastic waste challenges, it is directly related to household's demographic profile. The Government of Kerala is taking various measures to reduce household plastic waste in society and they are actively participating in waste management practices. Unfortunately, the public perception reveals that the government should enhance the awareness of plastic waste management systems in different districts. It indicates that the government should be more responsible to enlarge the awareness and education programme related to plastic waste in society. This study reveals that it is crucial to take necessary measures to reduce plastic waste by adopting proper plastic waste disposal practices that reduce the harmful effects on humans and the environment. It emphasizes that by prioritizing policies, the local administration can reduce plastic waste by adapting innovative measures and modern technologies. To keep plastic waste under control, individual accountability, corporate action and government policies are all needed.

Recently, the Government of Kerala relaxed the limit for single-use of plastic products in response to the pandemic, which resulted in a rise in household use of plastic products, especially at houses. Therefore, the government must enforce fines and penalties for using hazardous plastic products and this fund can be used to finance various initiatives to reduce the use of plastics. As part of the plastic waste management initiatives of the government are the local bodies like panchayath, municipalities and corporations should try to increase public awareness classes and education programmes on proper segregation of plastic waste at home. The empirical findings of this study also suggest that the Government of Kerala should invest an effective waste management practices and should establish a plastic waste disposal system for collection and recycling of plastic waste in each district.

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