IMPACT OF HARITHA KARMA SENA ON WASTE MANAGEMENT SYSTEM IN HOUSEHOLDS WITH A SPECIAL REFERENCE TO ERNAKULAM

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Abstract

The topic of environmental protection has attained highest importance in this global era but the basic practices of waste disposal are often seems neglected. In a state like Kerala there is a greater need for systematic waste management as the density is much higher compared to other states in India. As a densely populated state, the issues with regard to proper waste management are to be made in an intensive mode in Kerala. This study aims to investigate the impact of Haritha Karma Sena on waste management among households in Ernakulam. The study investigates the role of the Haritha Karma Sena in improving the waste management practices in Kerala, with an emphasis on the environmental, economic, social, and operational implications. Haritha Karma Sena is a community-driven initiative, has successfully decentralized waste management by engaging local communities in garbage segregation, collection, recycling, and public education. The study also examined the factors which influences waste management factors among households. A statistical analysis was carried out based on data collected, using a structured questionnaire instrument from 100 respondents selected through convenience sampling. The data collected from the respondents are tabulated and analyzed into logical statements mainly using Regression, Mean Comparison, Correlation and ANOVA. The results shows that the study instrument is reliable, as well as the study values are considered highly valid and acceptable. The study revealed that Haritha Karma Sena volunteers have a positive impact on waste management. The results also shows that the activities of Haritha Karma Sena significantly plays an important role in reducing improper treatment of waste and there by improve environmental quality.

Keywords: *Environmental protection, waste management, convenience and treatment*

INTRODUCTION

The earth's atmosphere is being changed at an unprecedented rate by pollutants resulting from innumerable human and economic activities. The increasing industrialization and fast growth does not only pose problems related to the allocation of resources and powers, but also severely challenges the natural environment. The increased consumption had laid heavy weight on industrial processes which has resulted in huge quantities of solid wastes. Human activities generate waste that can be harmful to the environment, animals, plants, and the ecosystem. These solid waste that gets accumulated from industries, shops and hospitals are the major land pollutants. They form a convenient breeding ground for mosquitoes, rats and other harmful insects. Such pollutants are responsible for the spread of major health hazards.

Solid Waste Management is therefore becoming an alarming issue and is gaining lot of attention in our country. One of the most important items in solid waste is plastics, which pose severe threat to environment and the ecosystem. The management of plastic waste has become a problem in all metros, municipalities and even in small villages. The waste management has become a tough task along with the population explosion. Solid waste management through scientific processing and recycling is considered as the only solution to solve this threat. Therefore there is a need of proper planning and implementation of comprehensive solid waste management system. The effective management of solid waste systems is essential to reduce global environmental and public health risks. Despite better educational systems and a higher literacy rate in Kerala, there is a lack of proper waste management practices among the residents, (both young and old). The appropriate waste management strategies are based on the principles of reduce, reuse, recycle and designing of appropriate collection, transportation, and processing and disposal system. Waste management has become an essential service that need to be provided by government for the wellness of public. Due to the rapid growth at which economics are expanding along with the rising living standards, led to increase the quantity and complexity of waste generated. Today waste management has become a serious issue in Kerala. It is due this alarming situation prevails, the government of Kerala has stated an initiative called Haritha karma sena. Haritha karma sena is micro entrepreneurial initiative under kudumasree mission. Haritha Karma Sena (HKS) or Green Task Force is a micro enterprise unit formed in each LSGI with 2 persons in each ward to do door to door collection of non-biodegradable waste & assist in biodegradable waste management by charging a user fee. Haritha Karma Sena was founded on the idea of turning waste into income. Haritha karma sena under Kudumbasree are working for a garbage free Kerala in collaboration with local self-governments. The social benefit

and environmental impact of Haritha karma sena are noteworthy. The group of women is making significant social progress by working at a forefront in collecting and processing the garbage that is dumped in water bodies and on the streets causing environmental waste problems. Haritha karma sena have collected 11,000 metric tons of sorted plastic and 51,000 metric tons of other non-organic waste in last

financial year handed it over the green Kerala company. Haritha Kerala mission, which work with the objective of water, cleanliness and yield, suchitwa mission, which provide technical assistance for sanitation activities, kudumbasree which take up poverty alleviation and woman empowerment as its main theme, clean Kerala company, which work to ensure the scientific treatment of the waste and employment guarantee mission, which help in the construction of source waste and treatment facilities. Haritha karma sena are run by local self-government bodies with the combined help of the regulated authority; the Kerala state pollution control board. Efficient and scientific treatment of plastic, organic and other waste are crucial in attaining the goal of 'Green Economy'.

STATEMENT OF PROBLEM

Solid Waste Management is one of the important obligatory functions of not only urban local bodies but also of rural local bodies. But this essential service is not efficiently and properly performed by the local bodies of Kerala, resulting in many health and sanitation problems. Waste management has come to be a serious issue in Kerala. The main problem was that the state did not have a successful model for waste management. Waste management is an essential service to be provided by the municipal and local government authorities at the local and state levels cite. The fundamental objective of Solid Waste Management program is to minimize the pollution of the environment as well as utilizing the waste as a resource. These goals should be achieved in a way that is financially sustainable, i.e. using methods that can be afforded by the community over the long term and with minimum risk to the persons involved. The Haritha Karma Sena, is an initiative launched by the Government of Kerala in India to promote waste management and environmental conservation. Haritha Karma Sena's waste disposal process includes waste segregation, collection, transportation, recycling, composting, and disposal. However, inadequate infrastructure and funding hinder efficient waste management. This study aims to determine the extent to which Haritha Karma Sena helps in waste management system in households.

NEED AND SCOPE FOR THE STUDY

Solid waste management refers to the process of collecting, treating, disposing, and recycling waste materials produced by human activities. It is an essential aspect of environmental conservation and public health, as improper waste management can lead to pollution, health hazards, and environmental degradation. The current study aids in the analysis of the influence of Haritha Karma Sena in the waste management process. This study could help government in learning more about the various effects that Haritha Karma Sena have on the waste management activities of households. To analysis and evaluate the waste management by Haritha karma Sena is the subject matter of the study. The scope of the study is restricted to households in Ernakulam district with the pre-determined objectives.

OBJECTIVES OF THE STUDY

1. To assess awareness and perception of urban households with regard to solid waste management by Haritha Karma Sena.
2. To assess the satisfaction level of respondents with regard to solid waste management by Haritha Karma Sena.

RESEARCH METHODOLOGY

The present study is causal and aims to investigate the impact of Haritha Karma Sena on waste management system in households with a special reference to Ernakulam. A descriptive research design was adopted to collect the primary data using structured questionnaire with convenience sampling method. The questions were systematically scaled at a five-point Likert scale. The sample size for this study is 100 respondents. IBM-SPSS 20 statistical software has been used for data analysis.

LITERATURE REVIEW

Colon & Fawcett (2006) in their study emphasized on the need of public-community participation system in household solid waste management services and asserted that the operational efficiency can be achieved by large scale involvement of private sector and local community along with the provision for incentives/subsidies to them in exchange of services rendered. It was also mentioned that public-private partnerships will not be effective and sustainable unless proper incentives for both sectors are built into the design.

Rajendran (2017) in his study stated that the success of waste management projects in Kerala is largely attributable to the public's active participation in garbage segregation at the source. The study emphasizes the need of educating the public and increasing local ability to efficiently manage waste. It concludes that community-based organizations like Haritha Karma Sena can play a

transformative role in developing a waste-conscious society while overcoming obstacles such as inconsistent involvement and financial viability.

Kumar & Radhakrishnan (2018) in their study revealed that Haritha Karma Sena has dramatically improved garbage segregation and recycling rates, resulting in cleaner public environments and less landfill waste. He also point out that, while the effort has received positive community support, a lack of suitable infrastructure, such as trash processing facilities, remains a significant barrier. The report emphasizes that Haritha Karma Sena's scalability is dependent on overcoming these infrastructural constraints.

Naik & Dandwate (2013) narrated that the reasons for prompt generation and obsolesces of e-waste include rapid economic growth, urbanization, the openness of the market, high research and development facilities, industrialization, increased consumerism etc. in India.

ANALYSIS AND INTERPRETATION

Variables	Category	No of Respondents	Percentage
Gender	Male	44	44
	Female	56	56
Age	Upto 30	19	19
	31-40 years	41	41
	41-50 years	23	23
	Above 50 years	17	17
Educational qualifications	No formal education	8	19
	High school	61	61
	Graduate	26	26
	Post graduate	5	5
Monthly income	Less than 10000	28	28
	10000-20000	40	40
	Above 20000	32	32
Occupation	Business/Self Employed	14	14
	Profession	26	26
	Salaried	42	42
	Others	18	18
Availability of land	NA (Flat)	10	10
	Below 10 cents	19	19
	10 - 20 Cents	35	35
	20 – 30 Cents	29	29
	More than 30 Cents	7	7
Location of the household	Rural	44	44
	Semi-Urban	33	33
	Urban	23	23
Commitment to reduce waste	No Commitment	8	8
	Somewhat	22	22
	Moderately	33	33
	Very much	37	37
Main method adopted for waste disposal	Land filing	6	6
	Open burning	12	12
	Composting	10	10
	HKS	72	72
Source of information on waste disposal	TV	12	12
	Newspaper	7	7
	Magazine	4	4
	Internet	25	25
	HKS	52	52
Main factor that influence your decision to depend on HKS for	Segregation of waste	39	39

waste disposal	Better health	18	18
	Safety	24	24
	Recycling	19	19

RELIABILITY STATISTICS

Variables	Items	Cronbach's Alpha
Awareness	5	0.821
Perception	5	0.803
Satisfaction	6	0.798
Challenges	7	0.780

Cronbach coefficient alpha was used for analyzing the reliability of statements with regard to celebrity endorsements. The results presented in table given below shows that all the individual dimensions of scale as well as the overall scale are reliable to use in this study, as the reliability score is higher than 0.7 for the overall scale and for individual dimensions it is higher than 0.6 which are the minimum standards set by Bryman and Bell (2015) in order to confirm the reliability of scale.

FACTOR ANALYSIS

KMO AND BARTLETT'S TEST

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.701
Bartlett's Test of Sphericity	Approx. Chi-Square	627.12
	df	49
	Sig	0.000

After reviewing the literature, the researcher identified several variables with regard to waste management by Haritha Karma Sena. These variables have been reduced into predominant factors with variable loadings as awareness, perception, satisfaction and challenges. Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy examines the proportion of variance in the measures caused by underlying factors. In the present study, Kaiser-Meyer-Oklin (KMO) measure of sampling adequacy (MSA) and Bartlett's test of Sphericity are applied to verify the adequacy or appropriateness of data for factor analysis. The Kaiser- Meyer-Olkin measure of sampling adequacy is an index for comparing the magnitudes of the observed correlation coefficients to the magnitudes of the partial correlation coefficients. From the table shown below it is found that KMO measure of sampling adequacy is 0.701. This test fulfills the assumption of KMO which needs to be more than 0.6 and here it is 0.701 which means that the sample is adequate up to 70.1%. Also, the significant value should be less than 0.05 and here P-value is 0.000 which means the result is appropriate and normality is achieved. Hence it can be concluded that the variables regarding waste management by Haritha Karma Sena were normally distributed and they have the potentiality to form the factors.

DESCRIPTIVE ANALYSIS ON WASTE MANAGEMENT BY HARITHA KARMA SENA

Variables	Mean	Std. Deviation
Awareness	3.83	0.80
Perception	3.73	0.75
Satisfaction	4.30	0.55
Challenges	4.25	0.55

Descriptive statistics have been performed in order to analyze the overall trend of responses against different dimensions in the questionnaire. The mean values for all variables in the study are higher than 3.0, which indicate that on an average, the responses received are closer to agreed on all the questions used in the questionnaire. The values of standard deviation for all variables are less than 1 which confirms consistent responses, i.e. limited variation in responses, which also proves the normality of data used

Awareness statements	Mean	Std. Deviation
HKS effectively engage with local communities to raise awareness about waste management practices	4.23	.632
HKS organizes awareness classes to make common people aware of consequences of careless dumping and unscientific disposal of waste	3.68	.922
HKS provides technical education and assistance related to disposal of wastes	3.72	.862
Haritha Karma Sena helped in gaining information regarding recycling of solid wastes.	3.88	.716

Haritha Karma Sena force to pay heavy fines to those who dump wastes unscientifically	3.63	.880

The above table gives an indication of awareness variable with regard to waste management by Haritha Karma Sena. It is found that a high mean score was attached to the statement that the HKS volunteers effectively engage with local communities to raise awareness about waste management practices. . It is also noted that HKS volunteers helped respondents in gaining information regarding recycling of solid wastes. The respondents stated that HKS provides technical education and assistance related to disposal of wastes. Also the awareness classes conducted by HKS helped common people to be aware of consequences of careless dumping and unscientific disposal of wastes.

Perception statements	Mean	Std. Deviation
HKS helps in proper waste management as improper waste disposal is a threat to environment	4.22	.463
Household waste management is the sole responsibility of local self-governments	3.68	.807
HKS induced me to take shopping bag to do grocery shopping	3.44	.882
HKS volunteers do the waste collection work as a social service rather than a job	3.65	.811
HKS plays a significant role in employment opportunities through waste management initiatives	3.66	.778

The above table gives an indication of perception variable of respondents with regard to waste management by Haritha Karma Sena. The respondents presume that HKS plays a crucial role in the proper waste management as improper waste disposal is a threat to environment. The respondents also believe that the household waste management is the responsibility of local self-governments of each locality. It is found respondents feels that HKS plays a significant role in employment opportunities for people through waste management initiatives. Also it is seen that respondents feels that HKS has induced them to take shopping bag when they go for grocery shopping.

Satisfaction statements	Mean	Std. Deviation
HKS volunteers are trying their level best in creating a waste free society	4.40	.544
HKS is very much effective in managing wastes in my community	4.35	.569
I am satisfied with the user fee I pay to HKS for their services on waste disposal	4.56	.462
HKS is very much transparent in communicating waste management strategies	4.21	.584
HKS helps in promoting sustainable consumption patterns among people	4.32	.516
HKS volunteers are successfully changing people's attitude toward improper waste disposal at home by raising awareness	3.89	.639

The above table gives an indication of satisfaction variable of respondents with regard to waste management by Haritha Karma Sena. It can be understood that, most of the respondents are satisfied with the user fee they pay to HKS for their services on waste disposal services done by HKS volunteers. Also respondents agrees that HKS volunteers are trying their level best in creating a waste free society and HKS is very much effective in managing wastes in their community. Also the respondents believes that HKS helps in promoting sustainable consumption patterns among them and it was found that HKS volunteers are successful in changing people's attitude toward waste disposal at their home.

Challenges statements	Mean	Std. Deviation
I do have issues with the activities of HKS on e-waste management	3.98	.632
HKS volunteers contributions are largely underappreciated by the society	4.42	.501
HKS volunteers are required to be more technological aware for waste management	4.69	.443
As the wages of HKS volunteers is too low, it often reflect in their waste collection	3.13	.929
Accumulation of waste in storage facilities often goes undetected and is not instantly removed	4.51	.476
Material collection facilities are only emptied by HKS when they reach full capacity	4.56	.504
The behavior of the HKS volunteers is not polite when the y comes for the collection of garbage from the houses	3.24	.868

The above table gives an indication of challenges variable of respondents with regard to waste management by Haritha Karma Sena. It is found that HKS volunteers are required to be more technological aware for waste management. Also HKS volunteers carry out material collection facilities are only emptied by HKS when they reach full capacity. Also accumulation of waste in storage facilities often goes undetected and is not instantly removed is one of the biggest problems faced by respondents. The

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respondents marked that the work of HKS volunteers are largely underappreciated by the society. Also there are certain issues faced by households with the activities of HKS on e-waste management.

TESTING OF HYPOTHESES

H1: Gender does have an influence on awareness of respondents to waste management by Haritha Karma Sena.

Gender	Mean	N	Std. Deviation	Minimum	Maximum
Male	3.84	44	.818	2.78	5.00
Female	3.81	56	.792	2.67	5.00
Total	3.83		0.80	2.67	5.00

Independent Samples Test

		Equal variances assumed	Equal variances not assumed
Levene's Test for Equality of Variances	F	1.053	1.053
	Sig.	.310	.310
t-test for Equality of Means	t	3.237	3.174
	df	48	41.353
	Sig. (2-tailed)	.002	.003
	Mean Difference	.27335	.27335
	Std. Error Difference	.08445	.08613

Independent sample t-test was used to find out whether any difference exists between genders of the respondents on awareness of respondents to waste management by Haritha Karma Sena. It is clear from the analysis that, the F-value of 1.053 is significant, at a level of significance of 5% (p=0.002). Hence it is concluded that gender have influence on awareness of respondents to waste management.

H1: Respondents commitment to reduce wastes has positive influence on respondent perception towards waste management by HKS

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	13.041	4	5.418	19.423	.000
Within Groups	55.458	95	2.71		
Total	68.499	99			

The respondents commitment F values in this situation is 19.423 and the sig. value is .000 (p<0.05). As the sig. value is less than 0.05 it is revealed that the respondents commitment influence positively in respondents perception towards waste management by HKS.

H1: There is a significant difference between location of the respondents and their commitment to reduce waste

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7.920	45	1.576	.548	.000
Within Groups	1.510	4	2.875		
Total	9.430	49			

The significance value in above analysis is below 0.05. It reveals that location of the respondents does have an influence on their commitment to reduce waste.

H1: There is a correlation between awareness of respondents to waste management by HKS and source of information on waste disposal.

		Awareness	Source of information on waste disposal
Awareness	Pearson Correlation	1	.722
	Sig. (2-tailed)		.001
	N	100	100
Source of information on waste disposal	Pearson Correlation	.722	1
	Sig. (2-tailed)	.001	

	N	100	100

A correlation analysis is carried between awareness and of respondents to waste management by HKS. Pearson's Correlation coefficient of 0.722 showed a positive and significant (p-value) correlation between the variables.

H1: The satisfaction level of respondents on waste management by HKS is based on awareness and perception of respondents towards waste management.

Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.841	.707	.705	.2314	1.822

a.   Predictors: (Constant), Awareness and Perception

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	1.726	4	.863	14.776	.000
Residual	2.745	95	.058		
Total	4.471	99			

a. Dependent Variable: Satisfaction level

b. Predictors: (Constant), Awareness and Perception

The model summary table shows R, R square, standard error of the estimate and the value of Durbin –Watson test. The R square value given in the model summary table is .707. This means that 70.7% of the variation in respondents satisfaction level on waste management can be explained by this model. The value of Durbin –Watson test is below the score of 2. Here the value of Durbin –Watson test is 1.822.

The ANOVA table shows that the value of F statistics and its significance value of less than 0.05. So the test results reveal that the satisfaction level on waste management by HKS is based on awareness and perception of respondents towards waste management. In other words, awareness and perception of respondents towards waste management have significant influence on respondents satisfaction level on waste management by HKS.

Coefficients showing the significance of awareness and perception of respondents on waste management by HKS

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.565	.341		7.533	.000
Awareness	.327	.061	.617	5.379	.001
Perception	0.20	.065	.035	.350	.002

a. Dependent Variable: Satisfaction level

The significance value of awareness of green products and perception is 0.001 and not exceeding 0.05. It is clear that the independent variable has significant influence on satisfaction level on waste management by HKS. Along with that when the relation between perception towards HKS on waste management on satisfaction level on waste management by HKS were analyzed the significance value obtained was 0.002 which is not exceeding 0.05. Hence it is derived that the perception has an influence on the satisfaction level on waste management by HKS.

H1: The satisfaction level of respondents on waste management by HKS is based on respondents commitment to waste reduction and main factor that induce them to depend on HKS for waste disposal.

Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.826	.682	.680.	.2892	1.852

a.   Predictors: (Constant), Commitment to waste reduction and Main factor that induce them to depend on HKS for waste disposal.

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	1.129	4	.564	7.936	.001
Residual	3.342	95	.071		

Total	4.471	99			

a. Dependent Variable: Satisfaction level
b. Predictors: (Constant), Commitment to waste reduction and Main factor that induce them to depend on HKS for waste disposal

The model summary table shows R, R square, standard error of the estimate and the value of Durbin –Watson test. The R square value given in the model summary table is .826. This means that 68.2% of the variation in satisfaction level on waste management can be explained by this model. The value of Durbin –Watson test is below the score of 2. Here the value of Durbin –Watson test is 1.852. The ANOVA table shows that the value of F statistics and its significance value of less than 0.05. So the test results reveal that the satisfaction level of respondents on waste management by HKS is based on respondents commitment to waste reduction and main factor that induce them to depend on HKS for waste disposal.

Coefficients showing the significance of commitment to waste reduction and main factor that induce respondents to depend on HKS for waste disposal

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.974	.188		15.815	.000
Commitment to waste reduction	.120	.036	.434	3.444	.001
Main factor that induce to depend on HKS for waste disposal	.071	.037	.240	1.902	.003

a. Dependent Variable: Satisfaction level

The significance value of reasons for commitment to waste reduction and main factor that induce them to depend on HKS for waste disposal is 0.000 and not exceeding 0.05. It is clear that the independent variable has significant influence on consumer purchase intention made by respondents. Along with that when the relation between commitment to waste reduction and on satisfaction level were analyzed the significance value obtained was 0.003 which is not exceeding 0.05. Hence it is derived that the commitment to waste reduction has an influence on satisfaction level of respondents.

CONCLUSION

The topic of environmental protection has attained highest importance in this era globally but the practices of basic concepts of waste disposal are often neglected. Haritha Karma Sena, an innovative waste management initiative, has emerged as successful initiative of Kerala government that aims towards forming a greener and sustainable future. The present study is conducted to know about the waste management by Haritha Karma Sena and how their activities lead to a green growth. The study found that the HKS volunteers have shown great promise in its efforts towards waste management and environmental conservation. Majority of respondents has shown satisfaction with the work undertaken by HKS volunteers in their areas. However, there are several challenges that need to be addressed in order to ensure its long-term success as there are problems such as reluctance of people to properly segregate wastes and negative attitudes towards the waste management which is yet to be solved.

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