

Economic Implications of Circular Economy Practices Among Middle Income Households in Chennai

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Abstract:

To ensure environmental sustainability, waste management and its effective disposal plays a vital role. Managing household solid waste is a major problem in rural as well as urban areas. Improper waste disposal leads to ill health of residents as well as sanitary workers. The concept of Circular Economy, the positive outcome of effective waste management and disposal still remain unexplored among households in urban areas. Therefore this research study is conducted to find out the practical possibilities of waste segregation from households in Chennai. The survey intends to find out the level of awareness on waste management methods and its relevance on residents participation in Circular Economic practices.

Key Words: Solid waste management, Disposal practices, Urban households, Awareness, Knowledge and Attitude.

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Introduction

Increasing population, urbanization, industrialization and changing consumption patterns are resulting in the generation of increasing amounts of solid waste. Due to different types of solid waste generated, the problem of improper disposal and segregation of solid waste arises. One of the major causes of environmental degradation is improper disposal of solid waste. It is a major cause of environmental pollution and outbreak of various diseases. Also, dumping of waste in open grounds leads to generation and release of Greenhouse Gases (GHGs) Hence, proper management of the generated waste is important in these circumstances.

The population increase in most of the world's emerging nations has posed numerous risks to both humanity and the environment. In the process of urbanization, industrialization, and globalization the world's economy has multiplied, also it has multiplied the problems of space constraint, pollution and waste management. Managing the above issues has become a major concern for the government agencies, regulatory authorities and pollution control boards. Management of solid waste in metropolitan cities is a major concern to be addressed. It has its own socioeconomic effects. So far a very few studies have given emphasis on socioeconomic effects of waste management. Thus, this research paper is an effort to investigate how socioeconomic issues are entwined with the process of waste management. Since the circular economy is a key component of sustainability, it is increasingly important to investigate the financial implications.

Chennai being one of the major metropolitan cities, the Greater Chennai Corporation and Municipal Authorities of the sub-urban parts, strive hard to manage waste generated from various sources. This study concentrates on the waste generated from households and the possibilities of implementing efficient waste management methods. The cost, time and area (space) involved in this process is a matter of concern for the middle-income group, which is taken as target population for investigation and also makes up the majority of Chennai households.

Review of literature

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1. Pooja Sawant and Vandana Gupta (2016) in their study “A Survey on Awareness and Attitude of People towards Household Solid Waste Disposal” revealed that, Public participation has a direct bearing on effective and efficient solid waste management. Thereby, giving mass awareness regarding the segregation of household waste and managing them properly becomes a necessity.
2. Tamilmani, Getrude Banumathi P, et.al.(2024) in their KAP study conducted on ‘Solid Waste Disposal Practices among Households in an Urban Area of Chengalpattu Municipality in South India’ The study found adequate knowledge in majority of the participants, however the attitude level and practice regarding proper waste disposal could be improved. Measures to encourage people towards adopting a committed attitude and good practice, regarding proper solid waste disposal can help achieve the goal of ‘Clean India’.
3. Rahmatika Dewi, Junita Widiati Arfani and Didit Herawan J in their study explored the university students’ awareness of the Circular Economy (CE) through the identification of knowledge, attitudes and behaviors (KAB). A total of 110 students studying economics-related courses from two Indonesian universities participated in the survey. A quantitative method is applied by adopting the SDG survey questionnaire of Cifuentes-Faura that was developed using the 5Rs (Reduce, Reuse, Refurbish, Repair and Recycle).The study found that the students’ awareness of the circular economy is higher in terms of knowledge (85.5%) than attitude (55.5%) and behavior (68.2%). The study also shows that students tend to buy new things instead of reusing/renting or repairing them. The female students' knowledge of CE is higher than male students, whereas their attitude and behaviour show similar results.
4. Prasad Modak, in his study on ‘Circular Economic Practices in India(2020) had introduced the concept and evolution of circular economy in India and explains the 6Rs, Reduce, Refurbish, Repair, Reuse, Remanufacture and Recycle. The case study presents the successes in adapting the circular economy. It also concluded India is far behind the concept and a long way ahead to improve our status.
5. Priya Priyadarshini and Purushothaman, (2020) in their study on ‘Circular economy practices within energy and waste management sectors of India: A meta-analysis’ attempted to ascertain the linkages between circular economy (CE) and sustainable development (SD) by examining the role of renewable energy (RE) and waste management (WM) sectors in CE combined with policy setup and enabling frameworks boosting the influx of circularity principles in the Indian context. Results revealed that research dedicated towards energy recovery from waste in India lacks integration with SD. Findings also revealed that although India is extremely dedicated towards attainment of the SDGs, penetration of CE principles within administration requires considerable efforts especially since WM regulations for municipal, plastic and e-waste lack alignment with CE principles.
6. C.Balakrishnan, in a survey conducted by him (2023) on ‘A Survey of household Solid waste Management in Chennai (A case study of residents around kodungaiyur,Chennai,Tamilnadu)’, the research paper surveys the current household Solid Waste Management (SWM) with reference of residents around kodungaiyur, Chennai. The survey indicated that the majority of the residents are very much concerned about the poor condition of the environment due to the inappropriate and improper SWM in Chennai Corporation. Very few of the localities have knowledge about reuse, reprocess, and compost. The residents are not much satisfied with the service of the corporation in regard to SWM.
7. Ashutosh Deshpande, Vasanth Ramanathan and Karthigaiselvan Babu (2024) in their study, ‘ A survey-based study Assessing the socio-economic factors affecting household waste generation and recycling behavior in Chennai’ analysed with the primary objective of identifying key socio-economic

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factors affecting waste generation and recycling. cations for waste management policies. The key findings of this study indicate that monthly income significantly influences waste generation, with lower income households producing more waste on average. Education level emerged as a predictor of recycling behavior, with higher-educated households exhibiting higher recycling rates. Furthermore, the study highlights the environmental and health impacts of socio-economic disparities in waste management, emphasizing the need for inclusive and sustainable waste practices.

8. Dr.Shankar and Dr.L.Kannan, in their study conducted on Assessment of knowledge, attitude and practices regarding household solid waste disposal among residents of an urban area in Chennai.(2023), had taken a survey among individuals above 18 years of age who were residing in the urban area of Tiruvanmiyur, Chennai. Systematic random sampling method was used and the interview was conducted using a semi-structured questionnaire which was validated and translated to the local language. 89.2% residents knew the difference between biodegradable and non-biodegradable waste. 39.8% residents agreed that there is room for improvement in the way solid waste is disposed of in their household. Proper household solid waste segregation is practiced by 43% residents. 86% residents dispose of their household wastes every day. Even though there is good knowledge about different types of waste and the importance of waste segregation, only less than half of the residents practice it. Further education and implementation by the public health department can help to improve solid waste disposal practices and reduce environmental pollution

Objectives

- 1.To analyze the level of awareness of circular economy practices (e.g., recycling, reusing, repairing, sharing) among middle-income households in Chennai.
2. To examine the economic impact (cost savings, changes in consumption patterns, etc.) of adopting circular economy practices on middle-income households.
3. To identify the key drivers and barriers influencing the adoption of circular economy behaviours in middle-income urban settings.

Need for the study

The study examines the potential effects of circular economy principles—such as sharing, recycling, reuse, and sustainable consumption. Promoting sustainable lifestyles that fit with both financial and environmental concerns require awareness. A sizable section of Chennai’s population lives in middle-class households, which are frequently caught between environmental responsibility and economic ambition. The study offers important information that helps improvising on, awareness of sustainable consumption, taking initiative for reuse/ recycle practises and determining how circular economy models affect household savings, spending trends, and resource management.

RESEARCH METHODOLOGY

Data Collection : The study is based on both primary and secondary data. Primary data was collected through a well structured questionnaire. Secondary data were collected through books, websites, magazines, journals, newspapers etc.

Sample Design A sample of 321 respondents has been selected for the study. Stratified random sampling method was used to collect the data from north Chennai, central Chennai, south Chennai,

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Kanchipuram and Thiruvallur district based on various demographic factors like gender, age, education, occupation and marital status.

DATA ANALYSIS AND INTERPRETATION

TABLE 1 – DEMOGRAPHIC PROFILE OF THE RESPONDENTS

Variables	options	Frequency	Percentage
Gender	Male	115	35.7
	Female	206	64.0
Age	18 to 28 yrs	67	20.8
	29- 38 yrs	139	43.2
	39- 48 yrs	70	21.7
	Above 48 yrs	45	14.0
Marital status	Married	201	62.4
	Unmarried	120	37.3
Qualification	School	79	24.5
	Graduate	129	40.1
	Post Graduate	51	15.8
	Professional	62	19.3
Occupation	Homemaker	45	14.0
	salaried	161	50.0
	Professional	36	11.2
	Business	75	23.3
	Students	4	1.2
Income	Below 4 lakhs	123	38.2
	4 to 6 lakhs	98	30.4
	6-8 lakhs	41	12.7
	Above 8 lakhs	59	18.3
Family Members	Less than 2	44	13.7
	2 to 4	180	55.9
	4 to 6	73	22.7
	More than 6	24	7.5

The above table shows that 35.7% of the respondents are male and 64% of the respondents are female. It is observed that 20.8% of the respondents are under 18-28 years, 43.2% of the respondents are under 28-38 age groups, 21.7% of the respondents are under 38-48 age groups and 14% of the respondents are above 48 age groups. In addition, 62.4 % of the respondents are married and 37.3% of the respondents are unmarried. It is inferred that 24.5% of the respondents belongs to the school level category, 40.1% of the respondents belongs to under graduate category, 15.8% belongs to post graduate category and 19.3% of the respondents belongs to the Professional or PhD category. It is found that 1.2 % of the respondents are Students, 50% of the respondents are Salaried, 14% of the respondents belongs to Homemaker and 11.2% of the respondents belongs to Business and Professional category.

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Also, 38.2% of the respondents' income level are less than 4 lakhs, 30.4% of the respondents are earning between 4-6 lakhs, 12.7% of the respondents are earning between 6-8 lakhs and 18.3% of the respondents are above 8 lakhs. 13.7 % of the family have less than 2 members, 55.9% of the respondents have 2 to 4 members, 22.7% of the respondents have 4 to 6 members and 7.5% of the respondents have more than 6 members

TABLE 2 – GENERAL INFORMATION REGARDING WASTE DISPOSAL

Variables	options	Frequency	Percentage
Kinds of solid waste	Paper and carton	65	20.2
	Plastics	91	28.3
	Food waste	122	37.9
	Tins/cans	31	9.6
	Fiber bags	8	2.5
	Glass	4	1.2
	Awareness	Yes	198
No		123	38.2
Know about SW	Radio	63	19.6
	TV	119	37.0
	Public Meeting	70	21.7
	Newspaper	60	18.6
	Poster	9	2.8
	Dispose	Public bin	189
on an open space		60	18.6
Lake/river side		42	13.0
Itinerant waste van		30	9.3
Place of Household		North chennai	89
	Central Chennai	81	25.2
	South Chennai	91	28.3
	Kanchipuram	42	13
	Thiruvallur	18	5.6
	Willing to segregate	Yes	196
No		125	38.8
Methods to reduce waste	Compost Preparation	52	16.1
	Reuse	95	29.5
	Recycle	118	36.6
	Selling for recycling business	36	11.2
	Burn	20	6.2

The above table shows that 20.2% of the respondents disposed paper and carton waste, 28.3 of the respondents disposed plastics, 37.9% of the respondents disposed food waste, 9.6% of the respondents

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disposed tins/cans, 2.5% of the respondents disposed fiber bags and 1.2% of the respondents disposed glass waste. 61.5% of the respondents have more awareness on waste segregation. In addition, 19.6% of the respondents known through radio, 37% through TV, 21.7% of the respondents known through public meeting, 18.6% of the respondents through newspaper and 2.8% of the respondents known through poster. 58.7% of the respondents disposed their waste in public bin, 18.6% disposed their waste on an open space, 13% disposed on river/lake and 9.3% disposed their waste in an Itinerant waste van. Also 27.6% of the respondents belong to north Chennai, 25.2% of the respondents belongs to Chennai central, 28.3% of the respondents belongs to south Chennai, 13% of the respondents belongs to Kanchipuram district and 5.6% of the respondents belongs to Thiruvallur district. Out of 321 respondents only 60.9% of the respondents are willing to segregate their waste and 38.8% of the respondents are not willing to segregate their waste. It is found that 16.1% of the respondents reduced their waste through compost preparation method, 29.5% of the respondents reduced through reuse method, 36.6% of the respondents reduced by recycle method, 11.2% of the respondents selling their recycling waste and 6.2% of the respondents reduced their waste by using burning method.

TABLE 3 – LEVEL OF AWARENESS

S.No	Statement	Mean	Standard deviation
I	Knowledge		
1	Improper solid waste removal & disposal affect human health	3.20	1.172
2	Advanced methods like sanitary landfills, incineration, or proper recycling	3.26	1.159
3	Improper waste causes diseases, odors, and infestations.	3.51	1.12
4	5 Rs (Refuse, Reduce, Reuse, Repurpose, Recycle)	3.51	1.71
II	Attitude		
1	Maintain a clean street and environment	3.55	1.16
2	waste disposal is the responsibility of the municipal sanitary worker alone	3.3	1.28
3	Willing to pay for a cleaner environment	3.51	1.052
4	Willingness to compost wet waste	3.47	1.105
III	Practice		
1	use dustbin to collect waste at home	3.68	1.038
2	Use separate containers for waste segregation	3.45	1.16
3	carry jute or cloth bag while going for shopping	3.58	1.106
4	use a dustbin covered with lid for waste collection	3.43	1.126

From the above table, it is found that the level of awareness regarding circular economy practices is comparatively higher in the dimension of Practice (M = 14.14), followed by Attitude (M = 13.83). while Knowledge (M = 13.48) records the lowest mean score among the three dimensions.

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Based on the mean scores, it can be inferred that respondents are having higher level of awareness in the practical aspects of circular economy. It shows that the respondents are particularly active in practices like using dustbins to collect domestic garbage, shopping with cloth or jute bags and using separate lidded containers for waste segregation.

Independent sample t-test between Gender and Level of awareness

Variables	Male			Female			t- value	P- value
	N	Mean	SD	N	Mean	SD		
Knowledge	115	3.410	1.430	206	3.350	1.163	0.3655	0.3575
Attitude	115	3.375	1.137	206	3.505	1.15	2.696	0.429
Practice	115	3.518	1.094	206	3.545	1.108	1.453	0.537

The results show that there is no significant difference between male and female respondents in terms of knowledge, attitude, and practice. For knowledge, males had a mean score of 3.410 while females had 3.350, and the p-value (0.3575) indicates no significant difference. Similarly, for attitude, males scored 3.375 and females 3.505, with a p-value of 0.429, showing no statistically significant difference. For practice, males had a mean of 3.518 and females 3.545, and the p-value of 0.537 also indicates no significant difference.

One way ANOVA- Qualification and Level of Awareness

		N	Mean	F value	P Value
KNOWLEDGE	School	79	12.8722	4.031	0.008
	Graduate	129	13.2705		
	Post Graduate	51	14.6098		
	Professional	62	13.1968		
	Total	321	13.3710		
ATTITUDE	School	79	12.9595	1.626	0.183
	Graduate	129	13.6496		
	Post Graduate	51	13.7490		
	Professional	62	13.5387		
	Total	321	13.4741		
PRACTICE	School	79	13.8861	1.063	0.365
	Graduate	129	14.0388		
	Post Graduate	51	14.8627		
	Professional	62	14.1129		
	Total	321	14.1464		

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The results show that education has a significant effect on knowledge but not on attitude or practice. Knowledge scores increase with education level, with postgraduates scoring the highest (14.61), and the difference is statistically significant ($p = 0.008$). In contrast, attitude and practice shows no significant differences across education levels, with p -values of 0.183 and 0.365. Overall, higher education is associated with greater knowledge, but it does not significantly affect attitude or practice.

One Way ANOVA – Annual Income and Level of Awareness

	Income	N	Mean	F Value	P Value
kNOWLEDGE	Below 4 lakhs	123	13.3033	1.860	.136
	4 to 6 lakhs	98	12.9367		
	6-8 lakhs	41	13.6854		
	Above 8 lakhs	59	14.0153		
	Total	321	13.3710		
ATTITUDE	Below 4 lakhs	123	13.5902	.201	.895
	4 to 6 lakhs	98	13.4041		
	6-8 lakhs	41	13.5171		
	Above 8 lakhs	59	13.3186		
	Total	321	13.4741		
PRACTICE	Below 4 lakhs	123	14.1382	.755	.520
	4 to 6 lakhs	98	13.8061		
	6-8 lakhs	41	14.4146		
	Above 8 lakhs	59	14.5424		
	Total	321	14.1464		

The analysis of variance indicates that there is no statistically significant difference in knowledge, attitude, and practice scores across different annual income groups. For knowledge, the difference among income categories was not statistically significant ($F = 1.860$, $p = 0.136$). Similarly, no significant difference was observed for attitude ($F = 0.201$, $p = 0.895$) and practice ($F = 0.755$, $p = 0.520$). Although respondents in higher income groups show slightly higher mean scores for knowledge and practice, these differences are not statistically significant. This suggests that annual income does not have a significant influence on knowledge, attitude, or practice levels among the respondents.

Annual income does not significantly influence the knowledge, attitude, and practice levels of the respondents.

TABLE IV - ECONOMIC IMPACT OF ADOPTING CIRCULAR ECONOMY PRACTICES ON MIDDLE INCOME HOUSEHOLDS

S.No	Statement	Mean	Standard Deviation
1	Household expenses on buying raw materials and new products can be reduced through practices like reusing, repairing, and recycling items	3.54	1.027
2	Income generation and employment opportunity could be provided through e-waste recycling and sustainable packaging solutions	3.42	1.007

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3	Through effective waste Management costs reduction is possible for Chennai municipality	3.44	1.02
4	By practicing responsible consumerism (Minimum usage of products) helps to reduce household expenses	3.55	1.086
5	Improved waste management practices (cleanly environment) reduces household healthcare expenditures.	3.62	0.944

It is observed from the above table that the highest mean score is Improved waste management practices (clean environment) reduce household healthcare expenditures ($M = 3.62$, $SD = 0.944$) followed by the statement by practicing responsible consumerism (minimum usage of products) helps to reduce household expenses” ($M = 3.55$, $SD = 1.086$) and “Household expenses on buying raw materials and new products can be reduced through practices like reusing, repairing, and recycling items” ($M = 3.54$, $SD = 1.027$), Through effective waste management, cost reduction is possible for Chennai Municipality” records a mean score of 3.44 ($SD = 1.020$), and lowest mean score is observed for Income generation and employment opportunities could be provided through e-waste recycling and sustainable packaging solutions ($M = 3.42$, $SD = 1.007$).

Overall, the results show that respondents are positively inclined toward the economic and social benefits of circular economy practices, particularly in terms of household savings and health-related cost reductions.

Independent sample T- Test – Gender and Economic impact of adapting circular economy

	Gender	N	Mean	T- Value	P- Value
Impact of adopting circular economy	Male	115	25.1000	-18.070	<.001
	Female	206	25.1000	-19.628	<.001

The result shows that both male and female respondents have the same mean score (Mean = 25.10) regarding the impact of adopting a circular economy. The t-test results indicate statistically significant values for males ($t = -18.070$, $p < 0.001$) and females ($t = -19.628$, $p < 0.001$), suggesting that respondents of both genders perceive the impact of adopting a circular economy as significant. However, since the mean scores are identical for both groups, gender does not influence the perceived impact of adopting a circular economy.

Gender has no significant influence on the perceived impact of adopting a circular economy.

One-way ANOVA- Occupation and Economic impact of adapting circular economy

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Occupation	N	Mean	F Value	P Value
Homemaker	45	25.1000	1.761	.136
salaried	161	25.1000		
Professional	36	25.1000		
Business	75	25.1000		
Students	4	25.1000		
Total	321	25.1000		

The results show that the mean score for the economic impact of adapting a circular economy is exactly the same (25.10) across all occupational groups—homemakers, salaried employees, professionals, business owners, and students. The F value is 1.761 and the p-value is 0.136, which is greater than 0.05. This indicates that there is no statistically significant difference in perceptions of the economic impact among different occupations.

One way ANOVA- Members and Economic impact of adapting circular economy

Number of Members	N	Mean	F Value	P Value
Less than 2	44	25.1000	.000	1.000
2 to 4	180	25.1000		
4 to 6	73	25.1000		
More than 6	24	25.1000		
Total	321	25.1000		

It shows that the mean score is exactly 25.10 for all groups based on the number of members. The F value is 0.000 and the p-value is 1.000, indicating that the number of members does not affect perceptions of the economic impact of adopting a circular economy, as all groups have the same mean score.

V LEVEL OF AWARENESS TOWARDS KEY DRIVERS AND BARRIERS OF ADOPTING CIRCULAR ECONOMY

S.No	Statement	Mean	Standard deviation
I	Key Drivers		
1	Environmental impact	3.44	1.049
2	Economic impact(cost savings) through Waste Management	3.33	1.066
3	Accountability of waste producers (CSR)	3.3	1.073
4	Technological impact (innovative methods of waste management)	3.26	1.039
5	Social Responsibility in waste Management	3.38	1.093
II	Key Barriers		

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1	Poor public awareness and participation	3.28	1.123
2	Financial Constraints in waste segregation	3.29	1.092
3	Lack of Infrastructure	3.57	1.017
4	Lack of space for segregation	3.34	1.244
5	Lack of clear enforcement	3.34	1.21

For Key Drivers, Environmental impact has the highest mean score (3.44), indicating it is considered the most important driver, followed by Social responsibility in waste management(3.38) and Economic impact (cost savings) through waste management(3.33). Accountability of waste producers (CSR) has a mean of 3.30, while Technological impact (innovative methods of waste management) has the lowest mean (3.26). The standard deviations, ranging from 1.039 to 1.093, suggest moderate variation in responses.

For Key Barriers, Lack of infrastructure has the highest mean score (3.57), making it the most significant barrier perceived by respondents. Other barriers include Lack of space for segregation (3.34) and Lack of clear enforcement (3.34), followed by Financial constraints in waste segregation (3.29) and Poor public awareness and participation (3.28). Overall, environmental concerns are seen as the strongest driver, while lack of infrastructure is viewed as the major barrier in waste management.

Oneway ANOVA – Age and Key drivers and barriers of adopting Circular Economy

		N	Mean	Std. Deviation	F Value	P Value
KeyDrivers	18 to 28 yrs	67	18.7716	3.28167	.929	.427
	29- 38 yrs	139	18.1719	3.17518		
	39- 48 yrs	70	18.1143	3.18735		
	Above 48 yrs	45	18.7889	3.25313		
	Total	321	18.3710	3.21005		
KeyBarriers	18 to 28 yrs	67	20.0806	7.35573	3.527	.015
	29- 38 yrs	139	17.9554	3.76452		
	39- 48 yrs	70	18.6000	3.33362		
	Above 48 yrs	45	19.3556	3.12581		
	Total	321	18.7358	4.65961		

The results show that age does not significantly influence Key Drivers, but it does significantly influence Key Barriers. For Key Drivers, the mean scores are quite similar across all age groups, ranging from 18.11 to 18.79. The p-value is 0.427, which is greater than 0.05. This means there is no statistically significant difference among the different age groups. It shows that the people of different ages have similar views regarding key driver.

For Key Barriers, the respondents aged 18–28 years have the highest mean score (20.08), while those aged 29–38 years have the lowest (17.96). The p-value is 0.015, which is less than 0.05. This indicates

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a statistically significant difference. It shows that the younger respondents (18–28 years) perceiving barriers more when compared to other age groups.

Oneway ANOVA – Income and Key drivers and barriers of adopting Circular Economy

	Income	N	Mean	F Value	P Value
KeyDrivers	Below 4 lakhs	123	17.5878	4.243	.006
	4 to 6 lakhs	98	18.7633		
	6-8 lakhs	41	18.7341		
	Above 8 lakhs	59	19.1000		
	Total	321	18.3710		
KeyBarriers	Below 4 lakhs	123	18.0699	1.758	.155
	4 to 6 lakhs	98	18.7918		
	6-8 lakhs	41	19.4195		
	Above 8 lakhs	59	19.5559		
	Total	321	18.7358		

For Key Drivers, the mean score increases as income increases. Respondents earning below 4 lakhs have the lowest mean score (17.59), while those earning above 8 lakhs have the highest mean score (19.10). The p-value is 0.006, which is less than 0.05. This means the difference is statistically significant. The findings show that the people with higher income levels view the key drivers more positively compared to those with lower income.

For Key Barriers, although the mean scores also increase with income (from 18.07 to 19.56), the F value of 1.758 and p-value of 0.155 show that this difference is not statistically significant. Overall, income significantly affects perceptions of key drivers but does not have a significant impact on perceptions of key barriers.

Oneway ANOVA – Members and Key drivers and barriers of adopting Circular Economy

	Members	N	Mean	F Value	P Value
KeyDrivers	Less than 2	44	18.3273	.862	.461
	2 to 4	180	18.1556		
	4 to 6	73	18.8534		
	More than 6	24	18.6000		
	Total	321	18.3710		
KeyBarriers	Less than 2	44	18.7682	1.783	.150
	2 to 4	180	18.5278		
	4 to 6	73	18.5425		
	More than 6	24	20.8250		
	Total	321	18.7358		

It shows that there is no statistically significant difference in Key Drivers and Key Barriers across the different experience groups. For Key Drivers, the mean scores ranged from 18.16 (2 to 4 years) to 18.85 (4 to 6 years), with an F value of 0.862 and a p-value of 0.461, indicating no significant difference ($p > 0.05$). Similarly, for Key Barriers, the mean scores ranged from 18.53 (2 to 4 years) to 20.83 (more than 6 years), with an F value of 1.783 and a p-value of 0.150, which is also not statistically significant. Overall, the findings suggest that years of experience do not significantly influence perceptions of key drivers and key barriers.

Suggestions

Presently, the situation of solid waste management has improved, with the cooperation of local municipal corporators in Chennai. The Greater Chennai Corporation encourages and motivates residents on waste segregation and insisting the motto 'My Garbage - My Responsibility. In fewer wards the collection and disposal of garbage has been outsourced to partners like Urbaser Sumeet. Even though the situation has improved as compared to past years, achieving the goal of zero waste disposal still requires lots of effort. Such efforts need to be taken at various levels, by the individual, the society and the community level. Based on the study the following suggestions can be incorporated for enhancing solid waste management:

1. Municipal authorities will promote the reuse and recycling of dry trash and run awareness campaigns about home waste segregation through a variety of channels.
2. By including appropriate solid waste disposal techniques into school and college curricula, awareness, education, and the significance of safe solid waste disposal should be started for the public at a younger age in order to attain the goal of good solid waste disposal practices in households.
3. Involve local communities in waste management decisions to learn about their preferences and concerns. Organise clean-up campaigns, workshops, and events to promote a sense of accountability and ownership. Public-private partnership involvement in management should be promoted.
4. Creating a sense of responsibility among family members in segregating and composting of the wet waste.
5. Local organisations promote and advertise laws pertaining to safe solid waste disposal techniques to the general population.
6. To guarantee that no waste is dumped in rivers, gutters, drains, open spaces, or public areas like parks, buildings, or streets, the local government or the Ministry of Environment should strictly enforce waste disposal regulations.
7. Strict oversight and monitoring by local authorities of solid waste management operations.
8. CCTV surveillance cameras can be installed on streets to capture incidents of burning, dumping, or other hazardous waste disposal methods. Violators may face fines or other penalties based on this evidence.
9. Simplifying the procedure for collecting waste from homes, such as making sure that the sanitary workers' visitation dates and times are strictly adhered to and that waste is collected from communal bins on schedule.

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10. Municipal sanitary workers are further motivated to operate more effectively when their efforts are acknowledged through felicitation celebrations.
11. Finding houses that regularly dispose of solid trash properly and praising them for their dedication to cleanliness can serve as positive reinforcement, which can inspire other households.
12. To promote solid waste management, corporations and regional non-governmental organisations could host a variety of trash management competitions.
13. Reward systems should be used to motivate an increasing number of communities, municipalities, and societies to promote people's active engagement, which can result in a clean city.

Conclusion

According to the findings of the study, a sizable portion of the population is segregating their waste, which demonstrates their favorable attitude toward solid waste management and the regulations set forth by the municipal authorities. However, there is still a lack of awareness regarding the types of waste, with people being unsure of what belongs in the dry waste bin and what belongs in the wet waste bin. Municipal officials and NGOs should strive harder to educate the people and to make it a practice. It is necessary to increase public involvement in waste segregation and appropriate, scientific management of wet waste through campaigning. Public private participation in effective waste segregation and disposal is the only solution to minimize the problem of waste management. Recycling and composting initiatives can also reduce waste management costs, as these activities are often less expensive than traditional waste disposal methods. Additionally, revenue can be generated through the sale of recycled materials, providing an additional source of income for waste management entities. Governments can also earn more revenue by collecting taxes and fees from waste management authorities. Therefore, by systematic operation of waste management systems, fund allocation can be done more efficiently which lead to reducing tax/financial burden on the society and directing the available funds for other social and economic priorities.

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