IMPACTOF PLANNING, COORDINATION AND RECYCLING OF PLASTIC WASTE HANDLING IN LODWAR TOWN-TURKANA COUNTY KENYA.

ABSTRACT

Plastic waste management has become a major public health and environmental concern in urban areas of many developing countries. Economic growth and population increase in the developing countries in recent years has caused an increase in utilization of natural resources that has led to unprecedented plastic waste generation.The uncontrolled plastic waste disposal has become a challenge in Africa and other developing countries due to insufficient or lack of human and financial capacities to remedy the situation. This study investigated the impact of planning, coordination and recyclingon plastic waste handling in Lodwar town. A cross-sectional descriptive study design was used. purposive sampling was used to select 345 respondents from Lodwar town and the county government employees including key informants from public health department at the county was adopted. Data were then analyzed for descriptive statistics with the aid of Statistical Package for Social Sciences (SPSS) version 26. The study findings showed that majority (78.6%) of the residents disagreed that there is reselling of plastic materials to avoid generation of wastage. Further majority (38%) also disagreed that they are reusing the plastics for other purposes in their households. Additionally, majority (55.9%) still disagreed that the municipality has recycling company, which has assisted in plastic material recycling. However, on the other hand majority (71.6%) of the residents were not aware if there is a new technological recycling machine in the county. The study revealed that majority of the respondents disagreed that there are waste collectors and transporters in the town (mean= 1.95, standard deviation=0.99). Majority of the respondents disagreed that the municipality have recycling company which has assisted in plastic material recycling (Mean=1.51, standard deviation=0.89). Majority of the residents strongly agreed that handling plastic waste in Lodwar municipality is of great concern (Mean=4.59, standard deviation=0.84). The study concluded planning and coordination have a significant effect on plastic waste handling in Lodwar municipality. There are no enough waste collectors and transporters in the town also Municipality has no clear waste management guideline/policy. Recycling methods have a significant effect on plastic waste handling in Lodwar municipality.The study recommended that the municipality administration should come up with waste management guideline/policy that will ensure efficient and reliable wastage handling.

Key words: Recycling methods, plastic waste handling, effectiveness and plastic waste handling, planning, coordination.

Introduction

Waste generation is directly related to human development, both technologically and socially. The composition of various wastes changed throughout time and location, with industrial development and innovation being directly tied to waste material output. Some garbage components have economic value and can be recycled once

adequately collected (Awunyo et al., 2013). (Awunyo et al., 2013). Waste management practice is another difficulty since it differs for established and developing nations, urban and rural locations, and residential and industrial producers. Management for non-hazardous residential and institutional garbage in metropolitan regions is normally the duty of the county government. In contrast, the management of hazardous commercial and industrial trash is usually the responsibility of the generator or waste producer. Tiny community groups have carried very little proportion on a modest scale. The circumstance tends to enhance family and individual community members' irresponsibility to care for the waste they produce, which accelerates indiscriminate waste disposal (Shabani, 2015).

Planning of plastic waste management is crucial since plastic is now an inherent part of the everyday activity of human existence and one cannot out rule out the advantages of plastic but the negatives can be lessened to some extent if plans to deal with plastic garbage are implemented (Sousa, 2021). There is a need for planning to separate plastic products from rubbish and at home, as well as management over this plastic for recycling, in order to limit the impact of Plastic garbage must be incinerated in incinerator facilities located outside of town. This method can eliminate massive amounts of plastic. There is a need for planning to employ cloth bags as consumer shopping bags. During planning it is advisable to use paper bags and bags made with textile material such as jute, cotton etc while going for shopping or for purchasing grocery products. Individuals can rely less on plastic bags while shopping in this manner (Patti, Cicala & Acierno, 2020).

Plastic waste is becoming an increasingly important environmental concern, necessitating extensive collaboration and coordination among stakeholders to mitigate its impact (Sandu et al., 2020). Collaboration and networks should be formalised between ministries in order to develop suitable policies and maximise the benefits of coordination. Coordination of public meetings in various areas of town to educate residents about the negative effects of plastic waste management and the importance of having it reused and recycled. Coordination and facilitation of environmental competitions on creative approaches to plastic waste management among local communities, youth and women groups, divisional schools, and other institutions (Asteria &Herdiansyah, 2022). Using "Environment Day" and other public holidays to

spread best practises and technologies for managing plastic Produce a film/video on environmental challenges in each division with specific emphasis on plastic waste management and use them for environmental awareness in each respective division (Alabi, Ologbonjaye, Awosolu&Alalade, 2019). (Alabi, Ologbonjaye, Awosolu&Alalade, 2019).

Plastic recycling is critical, both as a means of dealing with existing garbage and as a component of both the circular economy and zero-waste systems, which aim to reduce waste output and promote sustainability (Kerdlap et al., 2019). There are social, environmental, and economic ramifications around present garbage generation and disposal patterns. Today, while individuals and organisations seek to recycle more materials, there is a lack of understanding about how to do so successfully. Either this produces complications in the form of contamination, by mixing non-recyclable plastics with recyclable plastics or trying to recycle plastics contaminated by things like adhesives, solvents, and food leftovers that further impedes the recycling process (Cabrera-Papamija et al., 2022). (Cabrera-Papamija et al., 2022).

The Waste Management Plan (WMP) in Italy handles the management of all solid and liquid refuse produced, including hazardous and non-hazardous waste. Prevention, minimization, recycling and reuse, biological treatment, incineration, and landfill disposal are the long-recognized waste management (Luttenberger, 2020). The best waste management solution is to avoid creating waste in the first place. As a result, waste prevention is a fundamental goal of all waste management techniques. Numerous methods can be used to remove waste and, as a result, decrease or prevent pollution throughout the manufacture, usage, and post-use phases of product life cycles. Environmentally conscious manufacturing methods that incorporate less hazardous or harmful materials, the use of modern leakage detection systems for material storage, innovative chemical neutralization techniques to reduce reactivity, or water saving technologies that reduce the need for fresh water inputs are some representative strategies (Malinauskaite et al., 2017).

In Nigeria, recycling is one of the most important actions currently available to reduce these impacts and represents one of the most dynamic areas in the plastics industry today. Recycling provides opportunities to reduce oil usage, carbon dioxide emissions and the quantities of waste requiring disposal (Grigore, 2017). Here, we briefly set

recycling into context against other waste-reduction strategies, namely reduction in material use through down gauging or product reuse, the use of alternative biodegradable materials and energy recovery as fuel. Recycling of packaging materials has seen rapid expansion over the last decades in a number of countries. Advances in technologies and systems for the collection, sorting and reprocessing of recyclable plastics are creating new opportunities for recycling, and with the combined actions of the public, industry and governments it may be possible to divert the majority of plastic waste from landfills to recycling over the next decades.

As part of an environmental sustainability push, Uganda has launched a new public plastic waste collection initiative. Plastic pollution is currently one of the most serious environmental challenges, owing to a rise in single-use plastics and bad public disposal habits (Browning, Beymer-Farris & Seay, 2021). Plastic garbage that has not been properly disposed of includes hazardous substances that harm the ecosystem and pollute the land, water, and air. To encourage its customers and the general public to dispose of used plastics responsibly and thus reduce the tonnage of plastics disposed of in drainage systems and the environment, Vivo Energy Uganda and its partners have established public centralised collection points for plastic waste at its extensive network of Shell service stations across the country (Marazzi et al., 2020).

In Kenya, there has been much concern about the management by individuals and activists of NGOs of plastic waste (Bailey, 2022). Increased population and urbanization have contributed to growing uncertainty in waste generation and streams. While waste management laws and regulations are in place, inadequate implementation and bad practices have overwhelmed communities with their own waste, which has an impact on the public and environment (Mihai et al., 2021). In Nakuru, 45 per cent of the waste produced is estimated to be collected and disposed of at Giotto dumpsite, 18 per cent recycle and the remainder disposed of in an environmentally friendly environment (NEMA, 2015).

The informal settlement in Lodwar Municipality has huge, open dumps and blocked sewers, which constitute a threat to people's health. Unattended urban plastic waste presents health risks to people, for example waterborne diseases, resulting in a high rate of infant mortality (Mwangi, 2012). The Lodwar Municipalityis still facing serious problems with plastic waste management. It therefore, becomes important for

the study to determine the impact of planning, coordination and recycling of plastic waste handling in Lodwar Municipality.

METHODS

MATERIALS AND METHODS

Research Design

This was a cross-sectional descriptive. The design was suitable for this study because it generated the data that described the impact of planning, coordination and recycling of plastic waste handling in Lodwar Municipality among the traders and households at a form July to December 2021 of time within the Lodwar town municipality.

Target Population of the study

The study population was the residents (households) from the urban and peri urban, relevant key informants and traders who generate plastic wastes during their daily activities. The study also targeted the county authorities in Lodwar town, Turkana central sub county who are involved in plastic waste management policy making and monitoring of the implementation plans. It is difficult to get the counties exact figure for traders but Turkana County Traders Association had 1600 registered traders. For the household, the list of all the households was obtained from the municipality records. The municipality has been using these records for planning of the public services delivery to the residents over the years.

Sample Determination

For the household, a desired sample was selected using the formula as suggested by Fishers *et al*.[9] as below

$n = z^2pq/d^2$

Where:

n = the desired sample size

z= the corresponding value confidence level of 95% in the normal distribution table. This means that the 95% of the sample scores represented the true value of the households with Lodwar town.

p= the proportion in the target population who have knowledge and practices in waste management. A figure of 0.5 was used since there is no study showing the proportion of household with knowledge and practices on waste management.

q= 1 – p

d= the sampling error. It was set at 0.05. This was also called the margin error or level of precision. In this study, a level of plus and minus 5% was preferred. In addition, this level was set in social sciences studies.

This was substituted to;

$n = 1.96^2 \times 0.3 \times 0.5 / 0.05^2$

= 384 households + non-response rate of 10%

= 423 households

Sampling Techniques

Purposive sampling was used to select the traders and municipal workers. For traders, the research obtained respondents from the list of the traders registered by Turkana central sub county Traders Association for different business that generates the waste in Lodwar town. The businesses included shops/supermarkets, markets, Hotels, learning institutions, churches/mosque and government institutions among others. For the municipal workers the selection was based on the participation in management of the waste in Lodwar town.

For the households, a stratified sampling was done based on the economic status of the different estate. The households were divided into two strata (sub groups) namely those who lived in affluent urban estates and those who lived in peri urban areas. Proportionate distribution where the sample was distributed as per the size of the sub groups. This was done to ensure representation of the households in the sample. In each stratum, list of the household was done and individual household selected without replacement until the sample size for that stratum was achieved.

Research Instruments

The researcher used questionnaire for households and interview schedule for ccounty authorities in Lodwar town to collect data from sampled respondents. The questionnaire was divided into sections. The first segment collected personal information to assist understand the respondents' demographic profile. The remaining

portions included questions designed to provide answers to the researcher's study variables. The surveys were distributed by the researcher.

The interview schedule was designed for ccounty authorities in Lodwar town. The interview was performed through talks utilising a set of open-ended questions to get the respondents' relative opinions. This allowed the researcher to collect qualitative data that the questionnaires may not have caught.

Data Management and Analysis

Data was checked for accuracy, uniformity, logical completeness and consistency before analysis. Data were then analyzed with descriptive statistics with the aid of Statistical Package for Social Sciences (SPSS) version 26. Descriptive statistics included mean, frequency, percentage, and standard deviation. Frequency distribution tables did presentation of the findings.

RESULTS

Impact of planning, coordination and recycling of plastic waste handling in Lodwar Municipality

The study sought to assess the impact of planning, coordination and recycling of plastic waste handling in Lodwar Municipality.

Impact of Planning and Coordination on Plastic Waste Handling

The study sought to investigate the impact of planning and coordination on plastic waste handling in Lodwar municipality. The results are presented in Table 1.

Table 1. Planning and Coordination and Plastic Waste Handling

Statements		SA	A	UD	D	SD	μ	δ
1. There are waste collectors and transporters in the town	F	21	10	3	208	103	1.95	0.99
	%	6.1	2.9	0.9	60.3	29.9		
2. Plastic waste collection is done at household level	F	16	43	24	96	166	1.98	1.21
	%	4.6	12.5	7	27.8	48.1		

3. There is reusing/recycling of plastic waste generated at household level	**F**	17	81	92	90	65	2.7	1.17
	%	4.9	23.5	26.7	26.1	18.8		
4. Transportation of plastic waste to disposal sites are done by contractors	**F**	14	138	49	79	65	2.88	1.24
	%	4.1	40	14.2	22.9	18.8		
5. Lodwar Municipality has waste management guideline/policy.	**F**	21	40	117	97	70	2.55	1.12
	%	6.1	11.6	33.9	28.1	20.3		
Total number of respondents (n)	**345**							

Key: SA-Strongly Agree, A-Agree, UD-Undecided, D-Disagree, SD-Strongly Disagree, μ-Mean, δ -Standard Deviation

The study findings in Table 4revealed that 21(6.1%) of the respondents strongly agreed that there are waste collectors and transporters in the Lodwar town, 10(2.9%) agreed, three (0.9%) were undecided, 208(60.3%) disagreed and 103(29.9%) strongly disagreed. In terms of mean and standard deviation majority of the respondents disagreed with the statement that there are waste collectors and transporters in the town (mean= 1.95, standard deviation=0.99). The findings Also show that 16(4.6%) of the respondents strongly agreed that plastic waste collection is done at household level, 3(32%) agreed, 43(12.5%) were undecided, 96(27.8%) disagreed and 166(48.1%) strongly disagreed. In terms of mean and standard deviation majority of the respondents disagreed with the statement that plastic waste collection is done at household level (mean=1.98, standard deviation= 1.21).

The study findings further show that 17(4.9%) of the respondents strongly agreed with the statement that there is reusing/recycling of plastic waste generated at household level, 12(48%) strongly agreed, 81(23.5%) agreed, 92(26.7%) were undecided, 90(26.1%) disagreed and 65(18.8%) strongly disagreed. In terms of mean and standard deviation majority of the respondents were undecided with the statement there is reusing/recycling of plastic waste generated at household level (Mean=2.70, standard deviation=1.17). In addition, 14(4.1%) of the respondents strongly agreed that transportation of plastic waste to disposal sites are done by contractors, 138(40%) agreed, 49(14.2%) were undecided, 79(22.9%) disagreed and 65(18.8%) strongly disagreed. In terms of mean and standard deviation majority of the respondents were

undecided with the statement that Transportation of plastic waste to disposal sites are done by contractors (mean=2.88, standard deviation= 1.24). Lastly, 21(6.1%) of the respondents agreed with the statement that Lodwar Municipality has waste management guideline/policy, 40(11.6%) agreed, 117(33.9%) were undecided, 97(20.3%). disagreed and 70(28.1%) strongly disagreed. In terms of mean and standard deviation majority of the respondents were undecided with the statement that Lodwar Municipality has waste management guideline/policy (Mean=2.55, standard deviation=1.12).

Table 2: Recycling Methods on Plastic Waste Handling.

	Statements		**SA**	**A**	**UD**	**D**	**SD**	**μ**	δ
1	There is reselling of plastic materials to avoid generation of waste	**F**	12	9	37	271	16	2.99	1.13
		%	3.5	2.6	10.7	78.6	4.6		
2	The households are reusing the plastics for other purpose	**F**	27	116	49	131	22	1.74	1.04
		%	7.8	33.6	14.2	38	6.4		
3	The municipality have recycling company which has assisted in plastic material recycling	**F**	12	14	41	85	193	1.51	0.89
		%	3.5	4.1	11.9	24.6	55.9		
4	There is new technological recycling machine in the county	**F**	4	4	58	32	247	3.26	0.87
		%	1.2	1.2	16.8	9.3	71.6		
	Total number of respondents (n)	**345**							

Key: SA-Strongly Agree, A-Agree, UD-Undecided, D-Disagree, SD-Strongly Disagree, μ-Mean, δ **-Standard Deviation**

The study findings in Table 2 revealed that 12(3.5%) of the respondents strongly agreed that there is reselling of plastic materials to avoid generation of waste, nine (2.6%) agreed, 37(10.7%) were undecided, 271(78.6%) disagreed and 16(4.6%) strongly disagreed. In terms of mean and standard deviation majority of the respondents disagreed with the statement that There is reselling of plastic materials to avoid generation of waste (Mean=2.99, standard deviation=1.13). The study findings also show that 27(7.8%) of the respondents strongly agreed with the statement that the households are reusing the plastics for other purpose, 116(33.6%) agreed, 49(14.2%) were undecided, 131(38%) disagreed and 22(6.4%) strongly disagreed. In terms of

mean and standard deviation majority of the respondents disagreed with statement that the households are reusing the plastics for other purpose (Mean=1.74, standard deviation=1.04).

Furthermore, the study findings show that that 12(3.5%) of the respondents strongly agreed with the statement that the municipality have recycling company which has assisted in plastic material recycling, 14(4.1%) agreed, 41(11.9%) were undecided, 85(24.6%) disagreed and 193(55.9%) strongly disagreed. In terms of mean and standard deviation majority of the respondents disagreed with statement that the municipality have recycling company which has assisted in plastic material recycling (Mean=1.51, standard deviation=0.89). The study findings finally showed that four (1.2%) of the respondents strongly agreed that there is new technological recycling machine in the county, four (1.2%) agreed, 58(16.8%) were undecided, 32(9.3%) disagreed and 247(71.6%) strongly disagreed. In terms of mean and standard deviation majority of the respondents were undecided that there is new technological recycling machine in the county (Mean=3.26, standard deviation=0.87).

Plastic Waste Handling

The study sought to determine how plastic waste has been handled in Lodwar municipality. The results are presented on Table 3.

Table 3: Plastic Waste Handling

	Statement		SA	A	UD	D	SD	μ	δ
1.	The huge solid waste caused by plastics has been reduced	**F**	36	59	92	123	35	2.82	1.15
		%	10.4	17.1	26.7	35.7	10.1		
2.	The clogging up of valuable landfill space by plastic waste, which takes ages to break down, has been reduced.	**F**	23	27	43	189	63	2.3	1.07
		%	6.7	7.8	12.5	54.8	18.3		
3.	Plastic pollution has been reduced in the town	**F**	35	58	48	169	35	2.68	1.17
		%	10.1	16.8	13.9	49	10.1		
4.	Recycled plastic has been used to create items such as	**F**	9	31	67	103	135	2.06	1.09

	shampoo bottles, oil funnels, floor tiles and traffic cones among many other products.	**%**	2.6	9	19.4	29.9	39.1		
5.	Handling plastic waste in Lodwar municipality is of great concern	**F**	267	29	34	15	0	4.59	0.84
		%	77.4	8.4	9.9	4.3	0		
6.	Waste is collected regularly.	**F**	45	41	28	209	22	2.65	1.17
		%	13	11.9	8.1	60.6	6.4		
7.	Waste is collected from collection points in the estates/markets.	**F**	49	36	19	198	43	2.57	1.25
		%	14.2	10.4	5.5	57.4	12.5		
8.	Plastic waste is separated from waste collected before disposal	**F**	10	13	31	204	87	2.0	0.87
		%	2.9	3.8	9	59.1	25.2		
9.	Waste collection, transportation and disposal process is supervised and coordinated by Lodwar municipality authority.	**F**	13	100	52	127	53	2.69	1.15
		%	3.8	29	15.1	36.8	15.4		

Total number of respondents (n) 345

Key: SA-Strongly Agree, A-Agree, UD-Undecided, D-Disagree, SD-Strongly Disagree, μ-Mean, δ **-Standard Deviation.**

As shown in Table 3, 36(10.4%) of the residents strongly agreed that the huge solid waste caused by plastics has been reduced in Lodwar municipality, 59(17.1%) agreed, 92(26.7%) were undecided, 123(35.7%) disagreed and 35(10.1%) strongly disagreed. In terms of mean and standard deviation majority of the residents were undecided with statement that huge solid waste caused by plastics has been reduced in Lodwar municipality (Mean=2.82, standard deviation=1.15). There were 23(6.7%%) of the of the residents who strongly agreed that the clogging up of valuable landfill space by plastic waste which takes ages to break down has been reduced, 27(7.8%) agreed, 43(12.5%) were undecided, 189(54.8%) disagreed and 63(18.3%) strongly disagreed. In terms of mean and standard deviation majority of the residents disagreed with

statement that the clogging up of valuable landfill space by plastic waste which takes ages to break down has been reduced (Mean=2.3, standard deviation=1.07).

Another 35(10.1%) of the residents strongly agreed that plastic pollution has been reduced in the town, 58(16.8%) agreed, 48(13.9%) were undecided, 169(49%) disagreed and 35(10.1%) strongly disagreed. In terms of mean and standard deviation majority of the residents were undecided with statement that plastic pollution has been reduced in the town (Mean=2.68, standard deviation=1.17). The findings reveals that majority of the respondents were throne if huge solid waste caused by plastics has been reduced in Lodwar municipality. Furthermore, the residents were not clear if plastic pollution has been reduced in the town. However, majority disagreed that the clogging up of valuable landfill space by plastic waste which takes ages to break down has been reduced.

The findings also shows that 9(2.6%) of the residents strongly agreed that recycled plastic has been used to create items such as shampoo bottles, oil funnels, floor tiles and traffic cones among many other products while 31(9%) agreed. However, 67(19.4%) were undecided, 103(29.9%) disagreed and 135(39.1%) strongly disagreed that recycled plastic has been used to create items such as shampoo bottles, oil funnels, floor tiles and traffic cones among many other. In terms of mean and standard deviation majority of the residents disagreed with statement that the clogging up of valuable landfill space by plastic waste which takes ages to break down has been reduced (Mean=2.06, standard deviation=1.09). Further, 267(77.4%) of the residents strongly agreed that handling plastic waste in Lodwar municipality is of great concern while 29(8.4%) agreed, 34(9.9%) were undecided and 15(4.3%) disagreed. In terms of mean and standard deviation majority of the residents strongly agreed with statement that handling plastic waste in Lodwar municipality is of great concern (Mean=4.59, standard deviation=0.84). The findings reveal that even though majority of respondents disagreed that the clogging up of valuable landfill space by plastic waste which takes ages to break down has been reduced majority still agreed that handling plastic waste in Lodwar municipality is of great concern.

The findings further shows that 45(13%) of the residents strongly agreed that waste was collected regularly while 41(19.1%) agreed, 28(8.1%) were undecided, 209(60.6%) disagreed and 22(6.4%) strongly disagreed. In terms of mean and

standard deviation majority of the residents were undecided with statement that waste was collected regularly (Mean=2.65, standard deviation=1.17). There were 49(14.2%) of the residents strongly agreed that waste was being collected from collection points in the estates/markets while 36(10.4%) agreed, 19(5.5%) were undecided, 198(57.4%) strongly disagreed and 43(12.5%) strongly disagreed. In terms of mean and standard deviation majority of the residents were undecided with statement that Waste is collected from collection points in the estates/markets (Mean=2.57, standard deviation=1.25). The study findings reveal that majority of the residents were not aware if waste was being collected from collection points in the estates/markets. On the other way majority of the residents were not sure if waste was collected regularly.

The findings of this study additionally shows that 10(2.9%) of the residents stated that plastic waste is separated from waste collected before disposal. Another 132(3.8%) agreed, 31(9%) were undecided, 204(59.1%) disagreed and 87(25.2%) strongly disagreed. In terms of mean and standard deviation majority of the residents disagreed with statement that plastic waste is separated from waste collected before disposal (Mean=2, standard deviation=0.87). Further, 13(3.8%) of the residents strongly agreed that waste collection, transportation and disposal process is supervised and coordinated by Lodwar municipality authority, 100(29%) agreed, 52(15.1%) were undecided, 127(36.8%) disagreed and 53(15.4%) strongly agreed. In terms of mean and standard deviation majority of the residents were undecided with statement that waste collection, transportation and disposal process is supervised and coordinated by Lodwar municipality authority (Mean=2, standard deviation=0.87). The findings reveal that majority of the residents disagreed that plastic waste is separated from waste collected before disposal. However, majority of them also were undecided if that waste collection, transportation and disposal process is supervised and coordinated by Lodwar municipality authority.

DISCUSSION OF RESULTS

The objective of the study was to determine impact of planning, coordination and recycling of plastic waste handling in Lodwar Municipality. The study findings reveal that majority of the residents disagreed that there are enough waste collectors and transporters in the town. Inline majority of the residents further disagreed that they reuse/recycle plastics waste generated at their household le. However, on the other

hand majority were unaware if contractors do Transportation of plastic waste to disposal sites. In addition, majority of the residents have no clue if the Municipality has waste management guideline/policy. The findings agreed dos Muchangos, Tokai and Hanashima (2015) whose results indicated that institutional structural weakness and a lack of cooperation among stakeholders are the major contributors to poor waste policy performance in Maputo City.

The study findings reveal that majority of the residents disagreed that there is reselling of plastic materials to avoid generation of wastage. Further majority also disagreed that they are reusing the plastics for other purpose in their households. Additionally majority still disagreed that the municipality have recycling company, which has assisted in plastic material recycling. However, on the other hand majority of the residents were not aware if there is new technological recycling machine in the county. Crawford et al., (2017) stated that while reusing, recycling, and reducing waste materials has been recommended for many years, it is still not used for many buildings site tasks. Recycling is one of the most essential measures possible to mitigate these impacts and is one of the most dynamic areas of the plastics business today. Recycling gives chances to minimise oil consumption, carbon dioxide emissions, and trash disposal volumes. Plastic reduction measures have taken place in various locations in an effort to minimise plastic usage and pollution while also promoting plastic recycling.

The study findings revealed that majority of the residents agreed that handling plastic waste in Lodwar municipality is of great concern. The study findings concurred with Haregu et al. (2017) who noted that plastic waste management is one of the most visible urban services whose effectiveness and sustainability serves as an indicator for good local governance, sound municipal management and successful urban reforms. Waste management therefore is a very good indicator of performance of a municipality.

According to Kerdlap et al. (2019) plastic recycling is extremely important, both as a method to deal with existing waste and as a component of both circular economy and zero-waste systems that aim to reduce waste generation and increase sustainability.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions of the Study

The study concludes that there is no planning on waste collectors and transporters in the town and that plastic waste collection is done at household level. The study concluded that there is no coordination on the reusing/recycling of plastic waste generated at household level. There is no coordination of transportation of plastic waste to disposal sites and waste management guideline. The municipality has no recycling company which can assisted in plastic material recycling hence handling plastic waste in Lodwar municipality is of great concern.

RECOMMENDATIONS OF THE STUDY

i. The County government should plan to allocate resources to help come up with waste management company and introduction of new technological recycling machine

ii. Establish and sustain partnerships with various categories of waste management stakeholders including other counties, development partners, sectoral departments, waste picker organizations and civil society groups to facilitate delivery of capacity development training

iii. There is need for recycling of plastic waste, which helps the environment and creates new economic opportunities. Plastics recycling keeps still-useful materials out of landfills and encourages businesses to develop new and innovative products made from them.

REFERENCES

Alabi, O. A., Ologbonjaye, K. I., Awosolu, O., & Alalade, O. E. (2019). Public and environmental health effects of plastic wastes disposal: a review. *J Toxicol Risk Assess*, *5*(021), 1-13.

Aparcana, S. (2017). Approaches to formalization of the informal waste sector into municipal solid waste management systems in low-and middle-income countries: Review of barriers and success factors. *Waste management*, *61*, 593-607.

Assarroudi, A., Heshmati Nabavi, F., Armat, M. R., Ebadi, A., &Vaismoradi, M. (2018). Directed qualitative content analysis: the description and elaboration of its underpinning methods and data analysis process. *Journal of Research in Nursing*, *23*(1), 42-55.

Asteria, D., &Herdiansyah, H. (2022). The role of women in managing waste banks and supporting waste management in local communities. *Community Development Journal*, *57*(1), 74-92.

Awunyo-Vitor, D., Ishak, S., & Seidu Jasaw, G. (2013). Urban Households' willingness to pay for improved solid waste disposal services in Kumasi Metropolis, Ghana. *Urban Studies Research*, *2013*.

Azungah, T. (2018). Qualitative research: deductive and inductive approaches to data analysis. *Qualitative Research Journal*.

Bailey, I. (2022). Media coverage, attention cycles and the governance of plastics pollution. *Environmental Policy and Governance*.

Beaulieu, T., Sarker, S., & Sarker, S. (2015). A conceptual framework for understanding crowdfunding. *Communications of the Association for Information Systems*, *37*(1), 1.

Bonett, D. G., & Wright, T. A. (2015). Cronbach's alpha reliability: Interval estimation, hypothesis testing, and sample size planning. *Journal of organizational behavior*, *36*(1), 3-15.

Browning, S., Beymer-Farris, B., & Seay, J. R. (2021). Addressing the challenges associated with plastic waste disposal and management in developing countries. *Current Opinion in Chemical Engineering*, *32*, 100682.

Cabrera-Papamija, G., Machuca-Martínez, F., Rodríguez, L., Diosa, J., & Mosquera-Vargas, E. (2022). Plastic recycling and their use as raw material for the synthesis of carbonaceous materials. *Heliyon*, *8*(3).

Doody, O., & Doody, C. M. (2015). Conducting a pilot study: Case study of a novice researcher. *British Journal of Nursing*, *24*(21), 1074-1078.

Drost, E. A. (2011). Validity and reliability in social science research. *Education Research and perspectives*, *38*(1), 105-123.

Eriksen, M. K., Christiansen, J. D., Daugaard, A. E., & Astrup, T. F. (2019). Closing the loop for PET, PE and PP waste from households: Impact of material

properties and product design for plastic recycling. *Waste management*, *96*, 75-85.

Garson, G. D. (2019). *Multilevel Modeling: Applications in STATA®, IBM® SPSS®, SAS®, R, & HLMTM*. Sage Publications.

Gliem, J. A., & Gliem, R. R. (2003). Calculating, interpreting, and reporting Cronbach's alpha reliability coefficient for Likert-type scales. Midwest Research-to-Practice Conference in Adult, Continuing, and Community Education.

Grigore, M. E. (2017). Methods of recycling, properties and applications of recycled thermoplastic polymers. *Recycling*, *2*(4), 24.

Harris, L. (2003). *Trading and exchanges: Market microstructure for practitioners*. OUP USA.

Kast, F. E., & Rosenzweig, J. E. (1972). General systems theory: Applications for organization and management. *Academy of management journal*, *15*(4), 447-465.

Kerdlap, P., Low, J. S. C., & Ramakrishna, S. (2019). Zero waste manufacturing: A framework and review of technology, research, and implementation barriers for enabling a circular economy transition in Singapore. *Resources, conservation and recycling*, *151*, 104438.

Kumar, K. S., & Baskar, K. (2015). Recycling of E-plastic waste as a construction material in developing countries. *Journal of material cycles and waste management*, *17*(4), 718-724.

Luttenberger, L. R. (2020). Waste management challenges in transition to circular economy–case of Croatia. *Journal of Cleaner production*, *256*, 120495.

Malinauskaite, J., Jouhara, H., Czajczyńska, D., Stanchev, P., Katsou, E., Rostkowski, P., & Spencer, N. (2017). Municipal solid waste management and waste-to-energy in the context of a circular economy and energy recycling in Europe. *Energy*, *141*, 2013-2044.

Marazzi, L., Loiselle, S., Anderson, L. G., Rocliffe, S., & Winton, D. J. (2020). Consumer-based actions to reduce plastic pollution in rivers: A multi-criteria decision analysis approach. *PloS one*, *15*(8), e0236410.

Mihai, F. C., Gündoğdu, S., Markley, L. A., Olivelli, A., Khan, F. R., Gwinnett, C., ... &Molinos-Senante, M. (2021). Plastic pollution, waste management issues, and circular economy opportunities in rural communities. *Sustainability*, *14*(1), 20.

Mohajan, H. K. (2017). Two criteria for good measurements in research: Validity and reliability. *Annals of Spiru Haret University. Economic Series*, *17*(4), 59-82.

Mwanza, B. G., & Mbohwa, C. (2017). Drivers to sustainable plastic solid waste recycling a review. *Procedia Manufacturing*, *8*, 649-656.

Patti, A., Cicala, G., & Acierno, D. (2020). Eco-sustainability of the textile production: Waste recovery and current recycling in the composites world. *Polymers*, *13*(1), 134.

Sandu, C., Takacs, E., Suaria, G., Borgogno, F., Laforsch, C., Löder, M. M., ... & Florea, L. (2020). Society role in the reduction of plastic pollution. In *Plastics in the Aquatic Environment-Part II* (pp. 39-65). Springer, Cham.

Shabani, R. A. (2015). Factors Affecting Community Participation in Solid Waste Management in Lindi Municipal Council Tanzania. *Environment, Development and Sustainability*, *24*(3), 3791-3814.

Sousa, F. D. B. (2021). Management of plastic waste: A bibliometric mapping and analysis. *Waste Management & Research*, *39*(5), 664-678.

Stoeva, K., & Alriksson, S. (2017). Impact of recycling programmes on waste separation behaviour. *Waste Management*, *68*, 732-741.

Swerissen, H. (2007). Understanding the sustainability of health programs and organisational change. *AP ft VQ Council*.

Urtuvia, V., Villegas, P., González, M., & Seeger, M. (2014). Bacterial production of the biodegradable plastics polyhydroxyalkanoates. *International journal of biological macromolecules*, *70*, 208-213.

Watkins, D. C. (2017). Rapid and rigorous qualitative data analysis: The "RADaR" technique for applied research. International Journal of Qualitative Methods, 16(1), 1609406917712131.

Williams, M., & Moser, T. (2019). The art of coding and thematic exploration in qualitative research. *International Management Review*, *15*(1), 45-55.

Zhang, A., Venkatesh, V. G., Liu, Y., Wan, M., Qu, T., & Huisingh, D. (2019). Barriers to smart waste management for a circular economy in China. *Journal of Cleaner Production*, *240*, 118198.