

The Impact of User Attitude, Waste Education and Recycling on Sustainable Organizational Development of Waste Industry: Exploratory Factor Analysis

Isiaka Ilori Bolaji¹, Fakhrul Anwar Zainol^{2*}

¹Faculty of Business and Management, Universiti Sultan Zainal Abidin, Terengganu,
Malaysia.

E-mail: isiakailori@gmail.com

²Faculty of Business and Management, Universiti Sultan Zainal Abidin, Terengganu,
Malaysia

E-mail: fakhrulanwar@unisza.edu.my

DOI: 10.56201/ijgem.vol.11.no1.2025.pg50.71

Abstract

The implications of double in waste generation as a result of population increases, affect user attitudes, due to lack of waste education and recycling for sustainable organizational development. Further highlights the effect of indiscriminate disposal by users in an open area such as drainage systems, waterways, and undeveloped lands. The persistence of this problem, exacerbated by insufficient recycling facilities, and lack of waste education underscores the urgency of advancing solid waste management techniques within the framework of sustainable development. This study aimed to assess users' attitudes, waste education and waste recycling on sustainable organizational development of the waste management industry in Nigeria. In this study integration of environmental responsibility behavior theory and organization learning theory is important, the study employed a quantitative approach, a face-to-face questionnaire gathered from 487 Managing directors who are waste contractors (PSP), 100 participants were randomly selected from the target population area for a pilot study. The statistical package for social science (SPSS) is employed to analyze the findings. The results through exploratory factor analysis and Cronbach Alpha for internal reliability show that user attitudes, waste education and waste recycling significantly influence sustainable organizational development in the waste management industry which underscores the critical need for policy intervention. Therefore, advocates for environmental education and enhancing commitment to boost the waste management industry to bridge the gap also require further study. The finding provides a viable blueprint for enhancing commitment from policymakers, top management, individuals, and responsibility awareness for sustainability in the face of escalating waste challenges.

Keywords: Sustainable Organizational Development, User Attitude, Waste Education.

1. INTRODUCTION

The global population tends to increase in 2023 from 8 billion to 10 billion by 2050 (UNEP, 2024). This causes waste generation to double because of increases in population, urban development, and industrialization development. Subsequently, this has impacted everyone in the world because waste generation is predicted to rise globally by 70% from 2 billion tons generated annually to 3.40 billion by 2050. However, 33% of the waste generation was not managed environmentally (Kaza, 2018; UNDP, 2024). UNEP highlighted that developed Nations like the USA, the UK and Germany have achieved sustainable development up to 96% and developing nations like Malaysia, Singapore and Thailand have achieved 82%, while other developing nations like Senegal, Sierra Leone Sudan, and the Republic of Congo have achieved 39%, while other developing Nations in Africa countries like Nigeria achieved only 20-30% this creates a lot of challenges for Nigeria Waste management industry, for both present and future generations (Adedara et al., 2023).

Therefore, it is necessary to examine the challenges facing the waste management industry in Nigeria for sustainable organizational development. Nigeria has a population of 229 million as of 2024, up 2.39% from 2023. Likewise, waste from 32 million increased by 2.4% while 70% was not managed in effective management practices due to the weakening in regulatory enforcement, absence of quality management, lack of waste education, lack of initiative in the integration of technology equipment and lack of government investment UNDP. Furthermore, Lagos has 16 million inhabitants with a 3.63% growth rate from 2022 (United Nations, 2023). The waste generation because of the population increases in arithmetic progression form due to the pursuit of economic benefit, industrial and social activities, and migration of people to the city. Hence, organizational development of waste management is a concern. However, it was anticipated that 11 million tons of waste, and other trash was produced in 2023.

By 2050, the number is expected to increase to 456 million tons at 0.72 kilograms each person per day, according to the global statistical data available (Onamade et al., 2022). The global practice and traditional method of disposal employed by Nigeria's waste management created application gaps. The world waste management practices that create problems for Nigeria because of not adopting them are; Waste to energy, recycling, community waste education, expected producer responsibility and smart waste technology (Babatunde, 2023). These pose a threat to the inhabitants through environmental pollution arising from dumpsites, illegal dumpsites, water, and air because of indiscriminate disposal that are not adequately managed. Waste management errors can lead to air pollution, land erosion, and water contamination.

More importantly, long-term diseases may result from exposure to this toxic material, which might impact one's health. The current solution to the problem is not to stop producing waste, but under the environmental responsibility behavior (ERB) theory and learning theory the best option is to integrate them into a framework, which simplifies through empirical examinations. This said framework occurred because of the limited studies in waste management industry. However, the economic, social, industrial, and environmental effectiveness of urban solid waste management in a municipality in Lagos State Nigeria justify it. Furthermore, to gain social technological, and economic advantage through environmental responsibility theory, showcase the importance of theory. The theory offers condensed accounts of the complexity of

reality, the investigation is guided and concluded by theory, while some researchers failed to apply theory such as (Bui, 2020).

United Nations (2023) posit that the population of inhabitants in Lagos Nigeria was 16 million inhabitants making it the largest city in Africa with a 3.63% growth rate from 2021- 2022 at 0.72kg per person/day waste generation. As the population increases waste generation also doubles, without adequate facilities (Elehinafe et al., 2022). In addition, previous studies argue that Lagos produces about 13,000 tons of trash daily (Jayasekara & Dinugala, 2019). This is a potential investment opportunity and the challenge necessitates that the Lagos State Waste Management industry move to recycling for sustainability from waste to wealth rather than waste to waste. This will assist the traditional method of waste disposal from huge generation, collection, and disposal at dumpsites.

The policy for sorting at source needs to be implemented to achieve success in the recycling of waste to wealth (Babatunde, 2023). Moreover, the literature posits that the government spends N3 billion on rubbish disposal (Adediran, 2021). This indicates huge investment in waste evacuation which necessitated huge investments in resources recoverable from waste to wealth. There are five districts in Lagos called (IBILE) one of which is Epe, which is expected to be one of the largest industrial Areas in Africa. Each district required waste to wealth which required modern technology for regional waste development. As a result, Lagos State, Nigeria, would be the greatest industrial hub in Africa., this required the attention of policymakers to expect waste pollution that may arise through urbanization and industrial development.

2. LITERATURE REVIEW

2.1 Sustainable Organizational Development In Waste Management

The generation of municipal solid waste worldwide has increased because of economic expansion, industrialization, urbanization, and high standards of living (Mufandi et al., 2023). The most significant municipal service provided to residents by the government is solid waste management. However, waste management is an important element of environmental protection. An average urban resident in Lagos is thought to produce 0.72kg of municipal solid waste each person/day/per capita (Adedara et al., 2023; Olukanni & Oresanya, 2018). However, development in waste management is a major issue in developing nations due to the shortage of resources, lack of commitment by top management, lack of education, lack of infrastructure on waste high acquisition of equipment and high cost of maintenance. The argument for solid environmental responsibility theory is to provide efficient, economical solid waste storage, collection, transportation, and diversity of waste generation and disposal of waste in a hygienic without polluting the atmosphere, soil, or ecosystem (Doyle, 2019).

Moreover, previous works of literature have contemplated on challenges of waste management facing different countries during the pandemic and after (Ganguly & Chakraborty, 2021). But less is employed in the waste management industry particularly, regarding the generation, collection, disposition, education and recycling of enormous amounts of municipality solid wastes, as well as evaluating various guidelines for its removal. The review of 59 developing and developed countries found that many developed nations had successfully implemented

solid waste management development and were now heavily emphasizing the reduction, reuse, and recycling of waste management such as the USA, UK, Asia, and Africa (Bui, 2020; Mushtaq et al., 2020; Sharma & Jain, 2020). In developing countries including Lagos Nigeria, the municipal authorities in these nations are under pressure from the rising volume of waste created daily without adequate modern facilities. Furthermore, numerous definitions of waste contradict waste practice and waste management theories for sustainability (Doyle, 2019).

“Waste is what we do not want or fail to use” Waste from users like household bottles, plastic, rags, abandoned foods, agricultural waste, and others. These are waste due to failure to use resources through recycling or other transformations that end up in dumpsites or illegal dumpsites or lagoons causing pollution to humans, plants, and animals. Therefore, the real waste is residual from recycling that is no longer useful and accommodated by the dumpsite and byproduct of human activity that results from the inefficient use of recycling and resources (Yusoff et al., 2024). Babatunde (2023) posits that Africa has waste collection and coverage rates of 39%, which is still below 100% expectations and Nigeria is within the 20- 30% annually due to the absence of infrastructure, leader commitment, waste education, financial capacity and capacity development which affect sustainable organizational development. In addition to the dearth of research in the industry, waste generation assessment and characterization still creates a gap. Therefore, additional scientific research is required in the waste management industry.

For example, Lagos Nigeria is one of the largest metropolises in Africa and had 20 million residents in 2021 (Adedara et al., 2023). The same state in 2021 had a 14 million waste creation rate and characterization, and the ratio of population and waste generation was now in a progressive manner, stakeholders in the waste management industry, require an urgent need for sustainable organizational development and adequate scientific data analysis, waste diversity and recycling solutions to be implemented (Kumar & Agrawal, 2020). Many analyses also reveal that while numerous studies have been conducted on the garbage disposal, waste treatment, and user behavior, there are still limited studies on recycling, waste education and user attitude that influence sustainable organizational development in the waste management industry, particularly in Nigeria (Salim et al., 2023).

2.2 User attitude

The User's attitude has been an area of concern for researchers because it covers all stakeholders in the waste services as clients. This study refers to households for domestic services who are clients of private sector participants (PSP). However, user attitude and user behavior vary in levels of change assumed to be caused by the various methods by which people influence one another. To create a sustainable and high-quality environment, user commitment to sustainable development techniques is essential (Alhassan, 2020). Another study found that the behavior intention variable was influenced by performance expectation, effort expectation, facilitating condition, hedonic incentive, and habit, but not by the factors of social influence or price value (Profesi, 2019). Furthermore, attitude is a hypothetical construct that cannot be measured directly, it is assumed that attitudes can be measured through people's beliefs or opinions (Nook et al., 2021).

As a result, the theory argues that individual users, government, policymakers, and other

stakeholders in waste management should understand his/her responsibility toward sustainability. For the responsibility of sorting arrangements, the quality of the evacuator's holdings, services, and facilities. The effectiveness of its promotion, the involvement of users and cooperation will achieve the objective of recycling and eliminate discrimination of waste disposal in the Lagos environment. The government should mandate and implement a policy that each household should separate their waste before evacuation through effective communication.

2.3 Waste Recycling

Recycling has been defined by numerous authors as "a series of activities in which materials that are no longer useful to the generator are collected, sorted, processed, and converted into raw materials and used in the production of new products (Kattoua, 2019). Recycling is one of the management strategies used to reduce the amount of garbage dumped in dumpsites, produce raw materials, and aid in the preservation of the environment for future generations. The global effectiveness of any recycling program is largely dependent on citizens' active and persistent participation in households. Waste management theory aims to lessen the negative effects of waste on environmental resources, human health, and aesthetics. Reducing the hazardous effects of such waste on the environment and ecosystem is the goal of waste management (Solov'eva et al., 2023).

All of Nigeria's state waste management industry has an issue with a lack of facilities for recycling or waste to energy. The state waste collection, transportation, and disposal systems are not encouraging due to congested dumpsites resulting in low performance and non-payment for services rendered by users except through enforcement. Although the government provides subsidies but is not the last solution, a consistent regulatory policy of the government is needed and empower the evacuators to achieve the objectives of recycling. Unrecoverable dumpsites are in five districts, and the compactor vehicles that transport rubbish finish up in line at dumpsites due to logistic issues (UNEP, 2024). This has detrimental effects on the turnaround of the evacuators and ecosystem, waste at dumpsites contributes to groundwater pollution and global warming because of methane. Due to an inadequate system of trash segregation from the sources, the recycling is mostly done by the scavengers at the dump site. Putting recycling programs into action successfully is essential to the outcome. Establishing a recycling waste management program in each local government and Local council development Area. The author mentions the theory of environmentally responsible behavior which refers to a collection of measures adopted by people, groups, and organizations to reduce the consumption of natural resources and advance their sustainability (Gao et al., 2021).

2.4 Waste Education

The process of teaching people and communities about the negative effects that trash has on the environment, society, and economy as well as methods for managing, recycling, and reducing it is known as waste education. However, to decrease waste production and improve resource efficiency, it includes encouraging sustainable consumption habits, waste segregation at the source, and the concepts of the circular economy. In addition, this promotes long-term behavioral changes toward more sustainable waste management methods, recent studies emphasize the significance of including waste education in curriculum and public awareness initiatives (Xu et al., 2022; Zhao et al., 2023).

There are flaws in previous studies, the first flaw in the previous literature stated as follows: There is limited study in sustainable organizational development in the waste industry, needs such as empirical research. Therefore, this study attempts to fill the gaps (Burke, 2022; Doroshuk, 2019). Second, there is limited research on the relationship between user attitudes and sustainable organizational development in waste management, only a few studies found are mandatory policies positively influenced residents' attitudes and subjective norms toward waste separation (Adediran, 2021; Bagku, 2020; Jayasekara & Dinugala, 2019). Second, there is limited research on sustainable organizational development in waste management and user attitude tends to create differences in the studies, few studies found a relationship between perceived behavioral control (Ertz et al., 2021). Recycling and energy awareness on customer attitudes, benefits perception, and purchasing intentions (Akroush et al., 2019), Mandatory policies on residents' attitudes and subjective norms toward waste separation (Li et al., 2020).

Furthermore, there is limited research on the relationship between recycling and sustainable organizational development and the relationship between user attitude and sustainable organizational development in waste management. The few research studies found are customer attitudes, benefits perception, and purchasing intentions (Akroush et al., 2019), The effect of policy instruments on rural households' solid waste separation behavior and the mediation of perceived value (Ma et al., 2020). Hence, this study found the answer to the following research questions due to the limited research in the previous literature. Third is the location gaps, the previous literature was found in the United Kingdom such as Appolloni et al. (2022), Saldivia-Gonzatti et al. (2022) and (Alves et al., 2021). USA such as Mukherjee et al. (2020), Mushtaq et al. (2020), Kumar & Agrawal (2020), and other countries (Adedara et al., 2023; Sharma & Jain, 2020).

However, this study is carried out in Nigeria Lagos, the study provides some suggestions for improvement in implementing garbage education initiatives, user attitude and waste recycling to improve the sustainability of waste in this sector, with the integration of theories such as the environmental responsibility behavior theory (ERBT) and organizational learning theory OLT). The gaps found were subject to the development of a framework in this study (See Figure 2.1). This study's format is as follows; the study's basic hypothesis is based on the concise (short) literature assessments (review) on user attitude strategy, waste education, and sustainable organizational growth. Section 1 introduces the study and then moves on to a literature review. Section 3 discusses the measurements for each variable, and the methodology consists of data sample collection procedures. Section 4 examines exploratory factors, composite reliability, descriptive statistics, and the validity and reliability of the scales. Section 5 Discussion covered the findings.

Finally, Section 6 conclusion identifies the study's limitations and suggests different lines of inquiry for further research.

2.5. CRITICAL ANALYSIS OF THE RELATIONSHIP BETWEEN THE VARIABLES AND HYPOTHESIS DEVELOPMENT.

2.5.1. Household Attitude and Sustainable Development of Waste Management

SWM has become highly problematic in low-income and middle-income countries. Effective waste management strategies, funding accessibility, the choice of appropriate technology, and the sufficiency of trained personnel are some other significant challenges (Sharma & Jain, 2020). This study clarifies the worldwide idea of sustainable development in waste management to improve in waste management practices, collection, disposal, and household attitudes influence sustainable organizational development. Consequently, the previous literature failed to examine the relationship between sustainable development in waste management and household attitude. A few previous research found a direct relationship between perceived behavioral control such as Ertz et al. (2021), discovered that perceived behavior control has a direct impact on adequate waste behavior. Recycling and energy awareness has a favorable and significant impact on customer attitudes, benefits perception, and purchasing intentions (Akroush et al., 2019). Performing sustainable development in waste management and the willingness of the household results in positive relations for separation at the source (Sarbasov et al., 2019). Previous literature found that the household's income significantly influences the generation of waste, urban and rural trash generation is not significantly different (Jayasekara & Dinugala, 2019). Based on the above studies, there would be a positive relationship between household attitude and solid waste management.

H1: There is a positive and significant effect on the relationship between household attitude and sustainable organizational development of waste management in Nigeria.

2.5.2. Waste Recycling and Sustainable organizational development of waste management

Recycling creates highly effective resource recovery techniques for solid waste management byproducts (Zhao et al., 2021). However, the environment is protected from the hazardous effects of the inorganic and biodegradable elements included in trash through waste generation. Causing contamination of air pollution, soil erosion, and water poisoning can all result from improper waste management. Moreover, recycling has been used with different approaches such as making waste fun again! Gamification, while others gather used items and materials that are about to be thrown away and treat them to create materials that can be utilized materials like Paper products, glass bottles, soda cans, and some types of plastic must all be recycled according to the legislation. (Ozturkcan, 2020). Previous found that awareness of recycling and willingness to engage in solid waste management are correlated. Finally, the prior research forms the basis of the hypothesis, which holds that recycling and solid waste management are related. Based on the above previous studies, the hypothesis is developed that there is a link between recycling and sustainable development of waste management (Sharaai, 2022).

H2: There is a positive and significant effect on the relationship between recycling and sustainable organizational development of waste management in Nigeria.

2.5.3. Waste education and Sustainable organizational development of waste management

Waste education promotes an environmentally conscious culture and waste reduction techniques within the company, trash education is essential to sustainable organizational development (Ajaegbo, 2024; Goswami & Agrawal, 2023). Organizations can increase resource efficiency, lower operating costs, and improve their environmental performance by incorporating waste management methods into corporate sustainability organizational development into their frameworks. This will help the firm flourish over the long run. Recent research emphasizes how crucial it is to match organizational policies with garbage education to advance circular economy principles and meet sustainability objectives (Singh & Gupta, (S. Singh et al., 2024). Moreover, organizations with strong waste education programs are more likely to implement creative waste management techniques, supporting sustainable development objectives and enhancing overall waste management effectiveness, according to recent studies (Garrido-Moreno et al., 2024; Kalra et al., 2024). As a result of the above statement, hence hypothesis is developed that H3.

H3: There is a positive and significant effect on the relationship between waste education and sustainable organizational development of waste management in Nigeria.

2.6. PROPOSED WORK

The above hypothesis development led to the research objectives, and research questions to be answered by this study. RQ1: What is the effect of household attitude on the sustainable development of waste management RQ2: What is the impact of recycling on the sustainable organizational development of waste management RQ3: What is the significant effect of waste education on the sustainability organizational development of the waste management industry in Nigeria? Then, research objectives: To examine the impact of household attitudes and sustainable organizational development in waste management. Secondly, to investigate the impact of recycling on the sustainability of the waste management industry in Nigeria. Thirdly, to examine the significant effect of waste education on sustainable organizational development in the waste industry and validate all the items through exploratory factors analysis.

Consequently, to fill the gap between people's attitudes and sustainable development of the waste management industry in Nigeria there will be a need for each waste entity to be supported by technological advancement for efficiency to mitigate the effect of environmental pollution coming from increases in waste generation and changing the attitude of people disposal indiscriminate through learning. Finally, when every stakeholder is educated, then the individual will know their responsibility towards environmental responsibility behavior. In addition to the above-mentioned objectives, we observed several varieties of differences in previous literature and validated the instruments for further study, which this study aims to contribute to the body of knowledge for policymakers, practitioners, and academics. See below the study Framework (Figure 2.1).

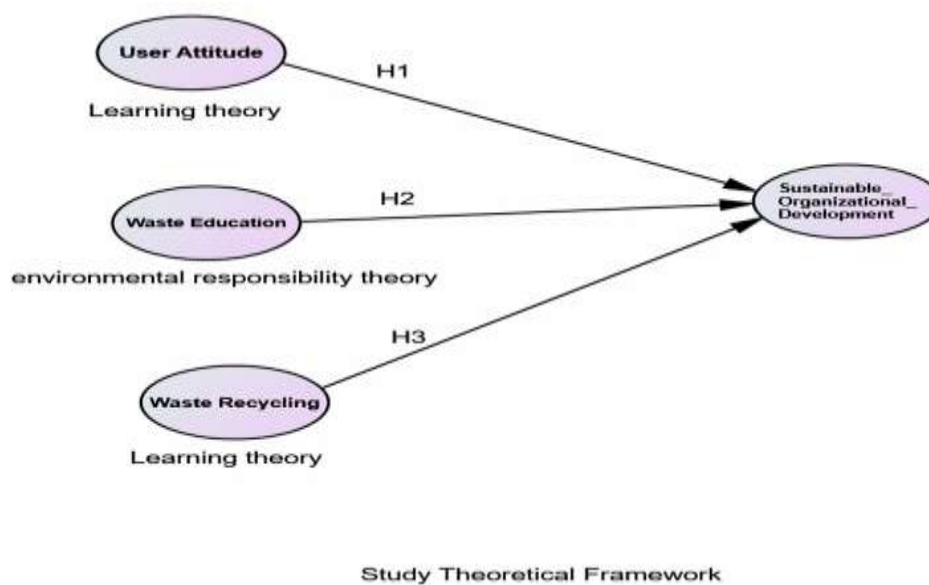


Fig. 2.1: Study Framework

Source: Researchers (2024)

3. METHODOLOGY

To achieve quantitative data through simple random sampling, a face-to-face questionnaire was used in this study to find 100 respondents who are managing directors of waste contractors in waste management organizations throughout the five districts. Lagos state southwest was chosen because of homogeneity in waste management techniques after placing the entire country in clusters because of its large population (Northeast, Northwest, Northcentral, south-south, south-east and southwest), Oyo state, Ogun state, Osun state, Ekiti state and Lagos state (such as Ikorodu, Badagry, Ikeja, Lagos Island, and Epe) (Pandey et al., 2020). Nevertheless, 487 CEO represent the entire population in Lagos state determines the sample size (Hair et al., 2019). Simple random sampling was employed to sample the pilot study from the target population to choose the potential participants for the study without bias, allowing participation from every district such as Ikorodu, Badagry, Ikeja, Lagos Island, and Epe to participate in the study.

A 5-point Likert scale was used in the development and arrangement of the questionnaires (K. Singh & Misra, 2021). The questionnaires were arranged in two sections. Firstly, respondents' demographics were arranged in Section A and Constructs in Section B, such as Sustainable organizational development as a construct (SOD) (Bolaji et al., 2024; Roy et al., 2023); following User Attitude (UA), (Hidayat et al., 2023) Waste Education (WE), (Kwakye et al., 2024) and Waste Recycling (WR), (Bolaji et al., 2025; Roy et al., 2023). All the instruments were adapted from earlier research.

4. RESULT

4.1 Analysis of Data

After validation of the instrument, the exploratory factor analysis was used to examine the data collected through the questionnaire, followed by a rotation matrix, chi-square, principal component analysis (PCA), Kaizen & Mayer Olkin (KMO), Bartlett's test, and descriptive statistics. The components result for mean, standard deviation and Cronbach Alpha for internal reliability (Baharum et al., 2023; Dehisat & Awang, 2020; Faizah et al., 2024; Puthanveetil et al., 2021). The analysis results were obtained using IBM-SPSS 26.0. The findings of the study are placed in the centre below, see Tables 1 to 17 and Figures 1 to 5.

Table 1: Descriptive Statistic User Attitude

Items no	Descriptive Statistics Items	Std.	
		Mean	Deviation
UA1	I am prepared for customers to pay more for waste management services that support environmental sustainability.	3.5800	.75452
UA2	Given the environmental advantages offered, I think the current waste management costs for services rendered are reasonable	3.4100	.86568
UA3	I support financial incentives for households that reduce their waste or increase recycling efforts.	3.6400	.75905
UA4	I believe that society will reap long-term financial rewards from investing in sustainable waste management practices.	3.6100	.77714
UA5	I believe that the money spent on services rendered in waste management contributes to a decrease in the quantity of waste produced in my service area.	3.6700	.69711

Table 2: Kaizen and Mayer Olkin (KMO) and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.888
Bartlett's Test of Sphericity	Approx. Chi-Square	368.809
	df	10
	Sig.	.000

Table 3: Total Variance Explained

Total Variance Explained			
Component	Total	Initial Eigenvalues	Cumulative %
		% of Variance	
1	3.821	76.422	76.422

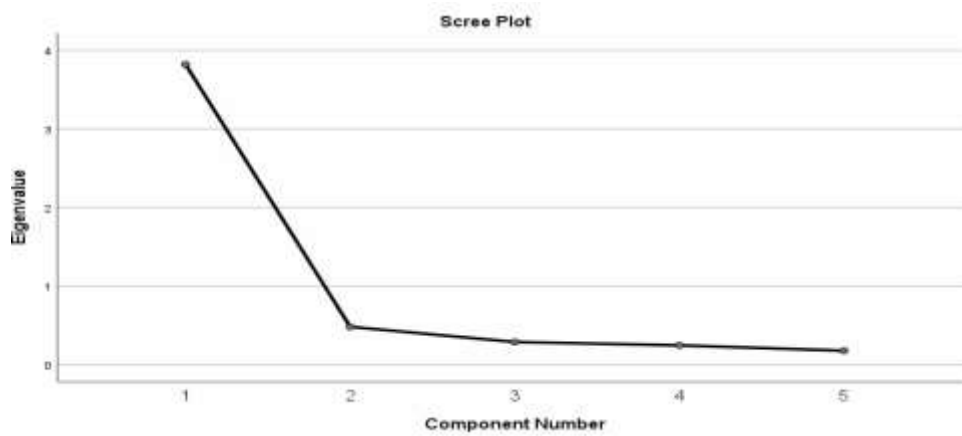


Figure 2: Scree plot for user attitude

Table 4: **Internal Reliability**

Constructs	Internal Reliability	
	Cronbach's Alpha	N of Items
User Attitude	.921	5

Table 5: Descriptive Statistics Waste Education

Item no	Descriptive Statistics	
	Mean	Std. Deviation

WE1	Participation of the Public in Rubbish Sorting: "I believe that public education and participation in waste sorting can significantly reduce landfill contributions.	3.5100	.78490
WE2	I understand how important it is to cut back on waste in my daily life.	3.8600	.80428
WE3	I am aware of the different kinds of waste that can be recycled	3.8700	.87219
WE4	I am aware that inappropriate trash disposal harms the environment	3.8800	.86783
WE5	To maintain equity and encourage sustainable practices, I think the government should regulate waste management costs.	3.8300	.87681

Table 6: KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.877
Bartlett's Test of Sphericity	Approx. Chi-Square	450.494
	df	10
	Sig.	.000

Table 7: Total Variance Explained

Total Variance Explained		
	Initial Eigenvalues	Cumulative
	% of	

Component	Total	Variance	%
1	3.977	79.548	79.548

Extraction Method: Principal Component Analysis.

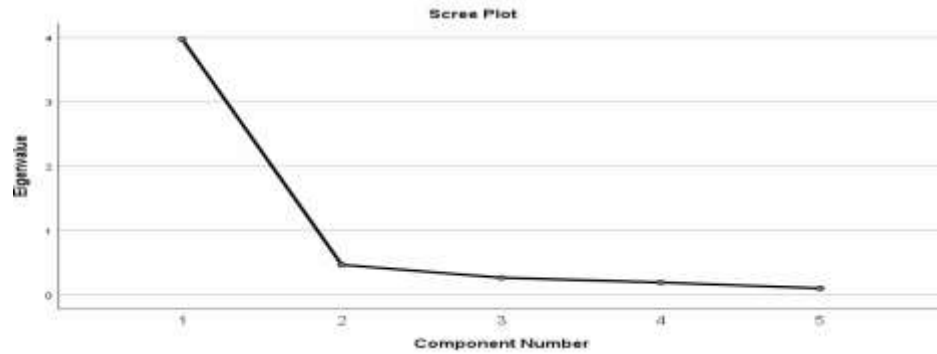


Fig. 3: Scree plot

Table 8: Internal Reliability for Waste Education

Constructs	Internal Reliability	
	Cronbach's Alpha	N of Items
Waste Education	.935	5

Table 9: Descriptive Statistics for Waste Education

Item no	Descriptive Statistics	Std. Deviation	
		Mean	on
WR1	"I think that communities and industries should make reducing the amount of waste that ends up in landfills a top priority	3.5400	.92573
WR2	I support increased recycling programs as a means to reduce the amount of waste sent to landfills."	3.4900	.94810
WR3	I am aware of the detrimental effects that landfills have on the environment.	3.5800	.02671
WR4	Waste-to-Energy Technology Investment: A way to reduce landfill waste and generate energy" is to support investing in waste-to-energy technologies	3.5700	.00760
WR5	The Source of Waste Minimization: An effective strategy for minimizing landfill waste" is to reduce waste at the source	3.5100	.92654

Table 10: KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.818
Bartlett's Test of Sphericity	Approx. Chi-Square	336.743
	df	10
	Sig.	.000

Table 11: Total Variance Explain

	Initial Eigenvalue	% of Variance	Cumulative %	Cumulative %
1	3.600	71.997	71.997	71.997

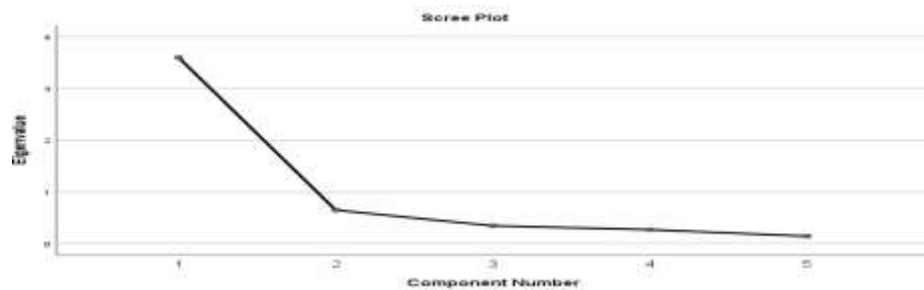


Fig. 4: Scree plot

Table 12: Internal Reliability for Waste Recycling

Internal Reliability		
Constructs	Cronbach's Alpha	N of Items
Waste Recycling	.902	5

Table 13: Descriptive Statistics for Sustainable Development

Descriptive Statement	Std. Deviation
-----------------------	----------------

Item no		Mean	n
SOD1	I think there should be more stringent government rules to cut down on the quantity of waste that is dumped in landfills	3.2400	.86597
SOD2	"I believe that reducing the amount of waste generated is a key goal for achieving sustainable development in the waste industry	3.3900	.93090
SOD3	I think government regulations should enforce sustainable waste management practices in the industry.	3.4300	.91293
SOD4	Diverting a larger percentage of waste from landfills is crucial for achieving long-term environmental sustainability	3.6300	.89505
SOD5	The responsibility for minimizing the amount of waste sent to landfills through better waste management practices should be established	3.6600	.80679
SOD9	I believe that the current laws in my community effectively address the reduction of waste.	3.6900	.11641
SOD8	Government regulations should provide financial incentives for individual organizations to increase recycling and to reduce waste pollution.	3.6300	.00156

Table 14: KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.722
Bartlett's Test of Sphericity	Approx. Chi-Square	459.117
	df	21
	Sig.	.000

Table 15: Total Variance Explained

Total Variance Explained							
Component	Initial Eigenvalues			Rotation Sums of Squared Loadings			
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	
1	3.521	50.297	50.297	3.520	50.279	50.279	
2	1.773	25.322	75.619	1.774	25.340	75.619	

Extraction Method: Principal Component Analysis.

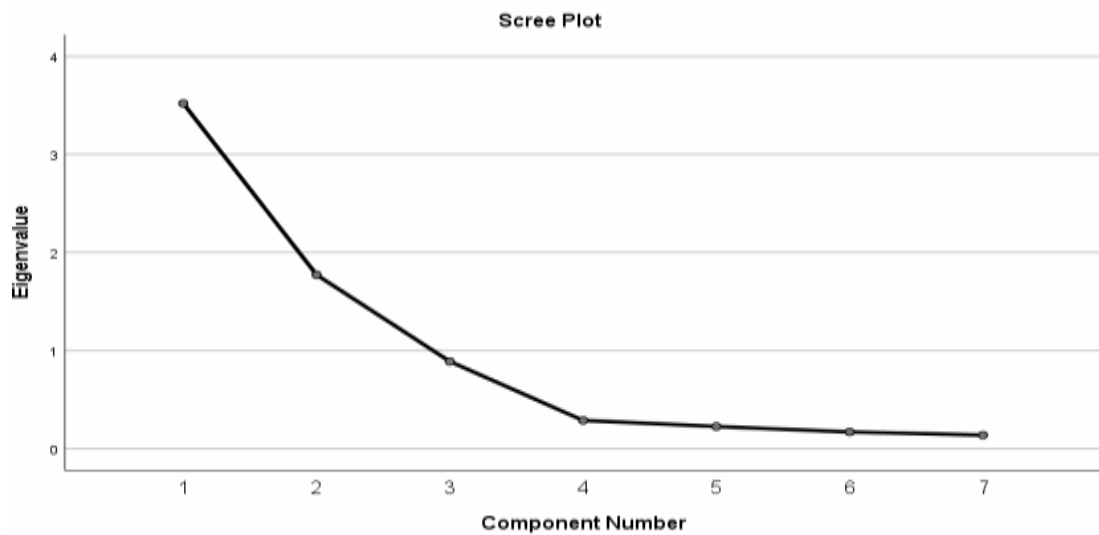


Fig. 5: Scree plot

Table 16: Rotated Component Matrix

	Rotated Component Matrix	
	Component	
	1	2
SOD1	.846	
SOD2	.894	
SOD3	.887	
SOD4		.935
SOD5		.930
SOD9	.785	
SOD8	.776	

Extraction Method: Principal Component Analysis.

Table 17: Internal Reliability for Sustainability Development

Constructs	Internal Reliability	
	Cronbach's Alpha	N of Items
Sustainable Organizational Development	.782	7

5. DISCUSSION

The result of the respondent demography was evaluated firstly, Age; those respondents above 40 years are 83%, while those below are 17%. Gender; male is 81% and female is 19% of the total sample size. Education; graduates are 74%, while postgraduate is 21% of the sample size, and secondary holder is 3%. Experience; above 6 years' experience are 89%, while those below are 11%. Subsequently, this study through the analysis, found that user attitude, waste education and, waste recycling is significant to the sustainable organizational development of the waste industry in Nigeria. See Tables 1 to 17 and Figures 1 to 5, of the result for descriptive statistics, followed by Kaizen and Mayer Olkin, total variance explains, supported by the scree plot graph, and internal reliability through the result of Cronbach Alpha. All these instruments for user attitude, waste recycling, waste education, and sustainable organizational development were related to achieving sustainability. Furthermore, every construct was validated by the study. The study suggested further study as a result, KMO greater than 0.6, total variance explains (TVE) above 60%, all rotated factor loading above 0.6, and Cronbach Alpha attained the minimum of 0.7 for all the construct regarding internal reliability as in Table 2, 3, and 4 for user attitude, for waste education sees above table 6, 7 and 8, while waste recycling sees table 10, 11, and 12. For sustainable organizational development having two rotated components see Tables 14, 15, 16 and 17.

However, drawing from the theoretical framework developed that supports learning theory, and environmental responsibility theory. This study examines the impact of user attitude, waste education and waste recycling on sustainable organizational development of the waste management industry in Nigeria. To promote public knowledge and involvement in waste recycling and waste education is necessary to mitigate waste pollution and for the government to take consistent and decisive action. The study emphasizes that recycling requires urgent attention to advance solid waste management techniques within the framework of sustainable development, which necessitates strong government action, financial support, and waste education.

6. CONCLUSIONS

Examining the relationship between user attitude, waste education, recycling and sustainable organizational development in the waste industry and validating the instrument through results of exploratory factor analysis and Cronbach Alpha for internal reliability are essential to answering the research questions about how to improve the waste management industry in Lagos Nigeria. However, the study suggested that future studies should add a moderator to the model is essential and seek for more large data coverage and confirmatory factor analysis (CFA) and Multigroup analysis in Structural Equation Modeling (SEM).

7. ACKNOWLEDGEMENTS

Authors express their gratitude to Almighty God for His boundless mercies and thank all the Managing Directors of trash contractors (PSPs) who participated in the questionnaire distribution during the data collection process in five districts of Lagos State, Nigeria.

8. REFERENCES

- Adedara, M. L., Taiwo, R., & Bork, H. R. (2023). Municipal solid waste collection and coverage Rates in Sub-Saharan African Countries: A comprehensive systematic review and meta-analysis. *MDPI*, *1*(2), 389–413.
- Adediran, I. (2021, September 8). Lagos community battles indiscriminate waste dumping by cart pushers. *The Premium News*.
- Ajaegbo, A. N., & Ph, D. (2024). *Influence of Entrepreneurial Leadership Education on Poverty Reduction as Perceived by Academic Staff of Tertiary Institutions*. *10*(10), 167–180. <https://doi.org/10.56201/ijssmr.v10.no10.2024.pg167.180>
- Akroush, M. N., Zuriekat, M. I., Al Jabali, H. I., & Asfour, N. A. (2019). Determinants of purchasing intentions of energy-efficient products: The roles of energy awareness and perceived benefits. *International Journal of Energy Sector Management*, *13*(1), 128–148. <https://doi.org/10.1108/IJESM-05-2018-0009>
- Alhassan, H. K. P. A. . O.-S. E. (2020). Households' source separation behaviour and solid waste disposal options in Ghana's Millennium City. *Journal of Environmental Management*, *259*, (110055.).
- Alves, L. R., Motta, W. H., & Unido, R. (2021). *Revista Produção e Desenvolvimento*. 1–20.
- Appolloni, A., Chiappetta Jabbour, C. J., D'Adamo, I., Gastaldi, M., & Settembre-Blundo, D. (2022). Green recovery in the mature manufacturing industry: The role of the green-circular premium and sustainability certification in innovative efforts. *Ecological Economics*, *193*. <https://doi.org/10.1016/j.ecolecon.2021.107311>
- Babatunde, F. (2023). Nigeria falls among 30 countries with the worst waste management practices. *Dataphyte*, *23*. <https://www.dataphyte.com/latest-reports/nigeria-falls-among-30-countries-with-the-worst-waste-management-practices/>
- Bagku. (2020). *Upcycling-Awareness-Campaign*. <https://www.facebook.com/profile.php?id=100067153028376>
- Baharum, H., Ismail, A., Awang, Z., McKenna, L., Ibrahim, R., Mohamed, Z., & Hassan, N. H. (2023). Validating an Instrument for Measuring Newly Graduated Nurses' Adaptation. *International Journal of Environmental Research and Public Health*, *20*(4).

<https://doi.org/10.3390/ijerph20042860>

- Bolaji, I. I. Z. F. A. A. Z. (2024). Technology innovation and sustainable organizational development in the waste management industry. *Malque.Pub. Multidisciplinary Review*, 1–14. <https://doi.org/doi.org/10.31893/multirev.2025026>
- Bolaji, I. I., Zainol, F. A., & Awang, Z. (2024). Exploring and Developing Instruments for Measuring Organizational Development in Waste Management Industry. *Twist*, 19(2), 154–165.
<https://twistjournal.net/twist/article/view/221%0Ahttps://twistjournal.net/twist/article/download/221/184>
- Bui, T. D. T. F. M. . T. M. L. A. M. H. (2020). Identifying sustainable solid waste management barriers in practice using the fuzzy Delphi method. *Resources, Conservation, and Recycling*, 154(104625).
- Burke, W. W. (2022). Organization development: What we know and what we need to know going forward. *OD Practitioner*, 36(3), 4–8.
https://c.yimcdn.com/sites/www.odnetwork.org/resource/resmgr/2014conference/Burke_What_We_Know_About_OD_.pdf
- Dehisat, M. M., & Awang, Z. (2020). Exploring Items and Developing Instrument for Measuring Organizational Performance Among Small Medium Enterprises in Jordan. *International Review of Management and Marketing*, 10(6), 51–57.
<https://doi.org/10.32479/irmm.10531>
- Doroshuk, H. (2019). Organizational development as a modern management tool for transformation of the company (case of Ukrainian energy company). *Management*, 23(1), 61–74. <https://doi.org/10.2478/manment-2019-0004>
- Doyle, G. (2019). A new era for reuse social enterprises in Ireland? The capacities required for achieving sustainability. *Resources, Conservation and Recycling*, 149, 65–74.
<https://doi.org/10.1016/j.resconrec.2019.05.012>
- Elehinafe, F. B., Okedere, O. B., Ayeni, A. O., & Ajewole, T. O. (2022). Hazardous Organic Pollutants from Open Burning of Municipal Wastes in Southwest Nigeria. *Journal of Ecological Engineering*, 23(9), 288–296. <https://doi.org/10.12911/22998993/150647>
- Ertz, M., Favier, R., Robinot, É., & Sun, S. (2021). To waste or not to waste? Empirical study of waste minimization behavior. *Waste Management*, 131(July), 443–452.
<https://doi.org/10.1016/j.wasman.2021.06.032>
- Faizah, A., Hardian, A. F. A., Nandini, R. D., Handayani, P. W., & Harahap, N. C. (2024). The Influence of Incentive-Based Mobile Fitness Apps on Users' Continuance Intention With Gender Moderation Effects: Quantitative and Qualitative Study. *JMIR Human Factors*, 11(August 2022), 1–16. <https://doi.org/10.2196/50957>
- Ganguly, R. K., & Chakraborty, S. K. (2021). Integrated approach in municipal solid waste management in COVID-19 pandemic: Perspectives of a developing country like India in a global scenario. *Case Studies in Chemical and Environmental Engineering*, 3(January), 100087. <https://doi.org/10.1016/j.cscee.2021.100087>
- Gao, Y., Ma, Y., Bai, K., Li, Y., & Liu, X. (2021). Which factors influence individual pro-environmental behavior in the tourism context: rationality, affect, or morality? *Asia Pacific Journal of Tourism Research*, 26(5), 516–538.
<https://doi.org/10.1080/10941665.2021.1876117>
- Garrido-Moreno, A., Martín-Rojas, R., & García-Morales, V. J. (2024). The key role of innovation and organizational resilience in improving business performance: A mixed-

- methods approach. *International Journal of Information Management*, 77(March), 102777. <https://doi.org/10.1016/j.ijinfomgt.2024.102777>
- Goswami, A. K., & Agrawal, R. K. (2023). It's a knowledge centric world! Does ethical leadership promote knowledge sharing and knowledge creation? Psychological capital as mediator and shared goals as moderator. *Journal of Knowledge Management*, 27(3), 584–612. <https://doi.org/10.1108/JKM-09-2021-0669>
- Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2–24. <https://doi.org/10.1108/EBR-11-2018-0203>
- Hidayat, I. I. N., Wisnalmawati, W., & Sugandini, D. (2023). Influence of Local Culture on Intention to Recommend through Destination Image. *Strata Business Review*, 1(2), 175–190. <https://doi.org/10.59631/sbr.v1i2.90>
- Jayasekara, T. R., & Dinugala, H. P. (2019). *Identifying Hidden Factors Affecting Household Solid Waste Generation for an Effective Waste Management System*. 1, 9–16. <https://doi.org/10.17501/26510251.2019.1102>
- Kalra, A., Lee, N. Y., & Dugan, R. (2024). Exploring antecedents and outcomes of salesperson change agility: a social exchange theory perspective. *Journal of Marketing Theory and Practice*, 32(3), 290–310. <https://doi.org/10.1080/10696679.2023.2169940>
- Kattoua, M. G. . . A.-K. I. A. K. S. (2019). Barriers on the propagation of household solid waste recycling practices in developing countries: State of Palestine example. . . *Journal of Material Cycles and Waste Management*, , 21, 774–785.
- Kaza, S. Y. L. C. (2018, September 20). *A Global Snapshot of Solid Waste Management to 2050*.
- Kumar, A., & Agrawal, A. (2020). Recent trends in solid waste management status, challenges, and potential for the future Indian cities – A review. *Current Research in Environmental Sustainability*, 2, 100011. <https://doi.org/10.1016/j.crsust.2020.100011>
- Kwakye, S. O., Amuah, E. E. Y., Ankoma, K. A., Agyemang, E. B., & Owusu, B. G. (2024). Understanding the performance and challenges of solid waste management in an emerging megacity: Insights from the developing world. *Environmental Challenges*, 14(October 2023), 100805. <https://doi.org/10.1016/j.envc.2023.100805>
- Li, W., Jin, Z., Liu, X., Li, G., & Wang, L. (2020). The impact of mandatory policies on residents' willingness to separate household waste: A moderated mediation model. *Journal of Environmental Management*, 275(September 2021). <https://doi.org/10.1016/j.jenvman.2020.111226>
- Ma, Y., Wang, H., & Kong, R. (2020). The effect of policy instruments on rural households' solid waste separation behavior and the mediation of perceived value using SEM. *Environmental Science and Pollution Research*, 27(16), 19398–19409. <https://doi.org/10.1007/s11356-020-08410-2>
- Mohamed Yusoff, N. I. Bin, Godsell, J., & Woolley, E. (2024). Towards zero waste: A comprehensive framework for categorizing household food waste. *Sustainable Production and Consumption*, 48(March), 1–13. <https://doi.org/10.1016/j.spc.2024.05.002>
- Mufandi I, Aini N, Jamilatun S, R. A. (2023). Exploring Cacao Husk Waste-Surface Modification, Characterization, and its Potential for Removing Phosphate and Nitrate Ions. *Journal of Ecological Engineering*.
- Mukherjee, C.1, Denney, J.1, Mbonimpa, E.G.1,* , Slagley, J.1, B. (2020). *Version of Record : https://www.sciencedirect.com/science/article/pii/S1878818116300172 © 2016 published*

by Elsevier . This manuscript is made available under the Elsevier user license.

- Mushtaq, J., Dar, A. Q., & Ahsan, N. (2020). Physio-chemical characterization of municipal solid waste and its management in high-altitude urban areas of North-Western Himalayas. *Waste Disposal and Sustainable Energy*, 2(2), 151–160. <https://doi.org/10.1007/s42768-020-00040-1>
- Nook, E. C., Satpute, A. B., & Ochsner, K. N. (2021). Emotion Naming Impedes Both Cognitive Reappraisal and Mindful Acceptance Strategies of Emotion Regulation. *Affective Science*, 2(2), 187–198. <https://doi.org/10.1007/s42761-021-00036-y>
- Olukanni, D. O., & Oresanya, O. O. (2018). Progression in waste management processes in Lagos State, Nigeria. *International Journal of Engineering Research in Africa*, 35, 11–23. <https://doi.org/10.4028/www.scientific.net/JERA.35.11>
- Onamade, A., Alagbe, O., Dare-Abel, O., & Daramola, S. (2022). an Empirical Study of Solid Waste Collection and Management. *Global Scientific Journal*, 10(11), 1602–1613.
- Ozturkcan, S. (2020). The deadly gamification challenge of #bluewhale. *Lecture Notes of the Institute for Computer Sciences, Social-Informatics and Telecommunications Engineering, LNICST*, 328 LNICST(November), 785–787. <https://doi.org/10.1007/978-3-030-53294-9>
- Pandey, N., Nayal, P., & Rathore, A. S. (2020). Digital marketing for B2B organizations: structured literature review and future research directions. *Journal of Business and Industrial Marketing*, 35(7), 1191–1204. <https://doi.org/10.1108/JBIM-06-2019-0283>
- Profesi, D. E. K. K. . A. M. R. K. J. (2019). User Attitude Analysis in the Academic Information System. *1st International Conference on Cybernetics and Intelligent System (ICORIS, I(IEEE.))*, 68-72).
- Puthanveetil, B. A., Vijayan, S., Raj, A., & MP, S. (2021). TQM implementation practices and performance outcome of Indian hospitals: exploratory findings. *TQM Journal*, 33(6), 1325–1346. <https://doi.org/10.1108/TQM-07-2020-0171>
- Roy, S., Basak, D., Bose, A., & Chowdhury, I. R. (2023). Citizens' perception towards landfill exposure and its associated health effects: a PLS-SEM based modeling approach. *Environmental Monitoring and Assessment*, 195(1). <https://doi.org/10.1007/s10661-022-10722-4>
- Saldivia-Gonzatti, L. I., Jannes, G., & Barreal, J. (2022). Factors influencing the rate of sorted solid waste collection: An empirical analysis towards local management in Catalonia (NE Spain). *Cities*, 131(November). <https://doi.org/10.1016/j.cities.2022.104038>
- Salim, H., Jackson, M., Stewart, R. A., & Beal, C. D. (2023). Drivers-pressures-state-impact-response of solid waste management in remote communities: A systematic and critical review. *Cleaner Waste Systems*, 4(January), 100078. <https://doi.org/10.1016/j.clwas.2023.100078>
- Sarbassov, Y., Sagalova, T., Tursunov, O., Venetis, C., Xenarios, S., & Inglezakis, V. (2019). Survey on household solid waste sorting at source in developing economies: A case study of Nur-Sultan City in Kazakhstan. *Sustainability (Switzerland)*, 11(22), 1–17. <https://doi.org/10.3390/su11226496>
- Sharaai, A. H. (2022). RELATIONSHIP BETWEEN LEVEL OF AWARENESS AND WILLINGNESS TO PARTICIPATE IN RECYCLING. *Proceedings of the World Conference on Waste Management*, Volume 3 No 1. <https://doi.org/https://doi.org/10.17501/26510251.2022.3104>
- Sharma, K. D., & Jain, S. (2020). Municipal solid waste generation, composition, and

- management: the global scenario. *Social Responsibility Journal*, 16(6), 917–948. <https://doi.org/10.1108/SRJ-06-2019-0210>
- Singh, K., & Misra, M. (2021). Linking Corporate Social Responsibility (CSR) and Organizational Performance: the moderating effect of corporate reputation. *European Research on Management and Business Economics*, 27(1), 100139. <https://doi.org/10.1016/j.iedeen.2020.100139>
- Singh, S., Deep Sharma, G., Radulescu, M., Balsalobre-Lorente, D., & Bansal, P. (2024). Do natural resources impact economic growth: An investigation of P5 + 1 countries under sustainable management. *Geoscience Frontiers*, 15(3), 101595. <https://doi.org/10.1016/j.gsf.2023.101595>
- Solov'ev Kostenko, S.....Z. P. S. V. (2023). A green hybrid extraction process for thiophene, quinoline and indole recovery from light hydrocarbon fractions. *Chemical Engineering Research and Design*, 191, 1–13.
- UNDP. (2024). *Regional Solid Waste Management Systems Including Recycling & Valorization*. <https://sdginvestorplatform.undp.org/market-intelligence/regional-solid-waste-management-systems-including-recycling-valorization>
- UNEP. (2024). Global Waste Management Outlook 2024 : Beyond An Age Of Waste. *Global Waste Management Outlook 2024*, 1–116. <https://wedocs.unep.org/20.500.11822/44939>
- United Nations. (2023). *Lagos, Nigeria Metro Area Population*. Lagos, Nigeria Metro Area Population 1950-2024. Wwww.Macrotrends.Net. Retrieved 2024-01-26.
- Xu, J., Yu, Y., Wu, Y., Zhang, J. Z., Liu, Y., Cao, Y., & Eachempati, P. (2022). Green supply chain management for operational performance: antecedent impact of corporate social responsibility and moderating effects of relational capital. *Journal of Enterprise Information Management*, 35(6), 1613–1638. <https://doi.org/10.1108/JEIM-06-2021-0260>
- Zhao, J, Maraseni, T., Qian, G. (2021). Implementation effect of municipal solid waste mandatory sorting policy in Shanghai. *Journal of Environmental Management*, 298(113512.).
- Zhao, S., Liu, M., Xi, M., Zhu, C. J., & Liu, H. (2023). The role of leadership in human resource management: perspectives and evidence from China. *Asia Pacific Business Review*, 29(1), 1–10. <https://doi.org/10.1080/13602381.2023.2146901>