International Journal of Civil Engineering, Construction and Estate Management,13(2),16-34,2025

Print ISSN: 2055-6578(Print)

Online ISSN: 2055-6586(online)

Website: https://www.eajournals.org/

Publication of the European Centre for Research Training and Development -UK

Management Processes and Determinants of Water Recycling Facilities of Corporate Real Estate Organisations in Nigeria

Igho Fayomi[1], Akintunde Adesoji Moronkeji[2]

[1,2] Department of Estate Management, Lead City University, Ibadan, Nigeria

doi: https://doi.org/10.37745/ijcecem.14/vol13n21634 Published August 18, 2025

Citation: Fayomi I. and Moronkeji A.A. (2025) Management Processes and Determinants of Water Recycling Facilities of Corporate Real Estate Organisations in Nigeria, *International Journal of Civil Engineering, Construction and Estate Management*,13(2),16-34

Abstract: *This study investigates the management processes and determinants of water recycling facilities within corporate real estate organisations in southwestern Nigeria, focusing on Lagos, Ogun, and Oyo States. These states were selected due to their high concentration of industrial and commercial estates where water recycling is increasingly adopted in response to urban water scarcity and rising operational costs. Employing a descriptive survey design, data were collected through structured questionnaires from 15 purposively selected organisations operating functional water recycling systems. Descriptive statistics (frequencies, means, percentages, and Relative Importance Index, RII) and factor analysis were used to analyse the data. Findings reveal that 86.7% of the organisations are privately owned, with 13.3% operating through public-private partnerships; none are government-owned. Most organisations (60%) employ fewer than 50 staff, and a majority operate at local (66.7%) or regional (33.3%) levels. The primary motivation for recycling is industrial use (86.7%), relying predominantly on domestic wastewater (80%). Despite some structured practices, such as the presence of recycling personnel (RII=0.693) and policies (RII=0.667); budgeting (RII=0.507), system upgrades (RII=0.453), and data-driven decision-making (RII=0.507) remain weak. Training, maintenance, and auditing practices were moderately implemented. Factor analysis identified eight core components influencing performance, including environmental regulation, institutional capacity, financial investment, and organisational culture. Challenges such as inadequate funding (RII=0.587), skills shortages (RII=0.667), and poor strategic planning (RII=0.373) undermine facility sustainability, although a high willingness to adopt new technologies (RII=0.72) was observed. The study recommends enhanced technical training, improved budgeting practices, and proactive maintenance strategies. It also calls for policy support through clear regulations, fiscal incentives, and stakeholder engagement to improve acceptance of recycled water. Ultimately, achieving sustainable water recycling in Nigeria's corporate real estate sector requires a coordinated blend of skilled management, financial commitment, technological adoption, and enabling government frameworks.*

Keywords: management, water recycling facilities, corporare real estate organisations, Nigeria

International Journal of Civil Engineering, Construction and Estate Management,13(2),16-34,2025

Print ISSN: 2055-6578(Print)

Online ISSN: 2055-6586(online)

Website: https://www.eajournals.org/

Publication of the European Centre for Research Training and Development -UK

INTRODUCTION

Water scarcity has become an increasingly pressing challenge across the globe, particularly in rapidly urbanizing and developing nations such as Nigeria. Rising population growth, unplanned urban expansion, and the over-exploitation of freshwater resources have heightened the demand for alternative water sources to support sustainable development (Akinbile & Yusoff, 2012; Olalekan et al., 2019). Water recycling, which involves the treatment and reuse of wastewater for various purposes, has emerged as an effective strategy to reduce dependence on conventional water sources and to promote environmental sustainability (Chong et al., 2013). In the corporate real estate sector, where large facilities such as office complexes, commercial centers, and industrial estates consume significant amounts of water daily, effective management of water recycling facilities is crucial for operational efficiency, cost reduction, and environmental stewardship (Mokhtar et al., 2016). However, the success of such initiatives depends largely on the quality of management processes and the factors influencing their implementation.

Despite the growing emphasis on sustainable water use, evidence suggests that water recycling practices in Nigeria are still underutilized, particularly within corporate real estate organisations. Several studies have highlighted challenges such as weak institutional frameworks, inadequate technical expertise, poor maintenance culture, and limited awareness among facility managers as barriers to the adoption and proper management of recycling systems (Nnaji & Mama, 2014; Adewumi et al., 2020). These challenges have resulted in inefficient facility management, underperformance of recycling plants, and missed opportunities for resource conservation. Moreover, while there is growing discourse on water management in residential or municipal contexts, research focusing on the corporate real estate sector; where the stakes are high due to the economic and environmental implications of water use, remains limited.

The aim of this study is to evaluate the management processes of water recycling facilities of corporate real estate organisations in Nigeria and to determine the key factors that influence their management. Addressing this gap is essential for enhancing sustainable water management practices within the built environment and aligning corporate real estate operations with global sustainability goals, such as the United Nations Sustainable Development Goal 6 on clean water and sanitation. By examining how corporate real estate organisations manage these facilities and identifying the determinants of successful management, the study provides practical insights for improving facility performance and promoting resource-efficient real estate operations in Nigeria.

Print ISSN: 2055-6578(Print)

Online ISSN: 2055-6586(online)

Website: https://www.eajournals.org/

Publication of the European Centre for Research Training and Development -UK

LITERATURE REVIEW

Water recycling and reuse have emerged as critical components of sustainable water management in the face of escalating global water scarcity. For corporate real estate organisations, which often operate large-scale facilities such as commercial complexes, office buildings, and industrial properties, the need for effective water recycling management has become increasingly urgent. This literature review examines the theoretical and empirical perspectives on water recycling, management processes, and determinants influencing the operations of such facilities, with a particular focus on corporate real estate organisations in Nigeria.

Corporate Real estate Organisations

Corporate Real Estate Organizations (CREOs) are increasingly recognized as critical institutional actors in advancing sustainability through built environment management. All over the world, CREOs are tasked with managing not only the physical assets of corporations but also the processes, policies, and systems that ensure those assets support environmental, economic, and social performance goals. In Nigeria, where environmental degradation, water scarcity, and urban expansion present acute challenges, the role of CREOs is becoming even more pronounced, particularly in the management of water resources through recycling initiatives.

CREOs in Nigeria are typically embedded within larger commercial or industrial entities, managing a range of infrastructural facilities including wastewater treatment systems, office buildings, and utility plants. As observed by Deloitte (2024), the strategic integration of environmental sustainability into corporate real estate decisions has become vital, especially in regions facing regulatory pressure and resource scarcity. For Nigerian CREOs, the determinants of water recycling adoption are linked not only to internal management processes but also to regulatory frameworks, capital availability, technological capacity, and public infrastructure deficits.

Globally, CREOs have embraced sustainable real estate strategies in response to rising ESG expectations. However, in Nigeria, the institutional landscape is more fragmented, and many CREOs operate with limited autonomy or technical expertise. This has implications for the implementation of water recycling facilities, which require capital-intensive investments, skilled labor, and regulatory clarity. As Financial Executives International (2023) notes, even in more advanced economies, CREOs face challenges in linking environmental investments to measurable

Print ISSN: 2055-6578(Print)

Online ISSN: 2055-6586(online)

Website: https://www.eajournals.org/

Publication of the European Centre for Research Training and Development -UK

returns. In the Nigerian context, these challenges are amplified by inconsistent policy enforcement and infrastructural underdevelopment.

A recurring theme in the literature is the influence of organizational commitment and leadership on the success of environmental programs. For example, Sireas (2024) emphasizes the role of internal champions in driving sustainability innovation through facilities management. In Nigeria, where private-sector organizations dominate real estate ownership, commitment from top-level management is a significant determinant of whether water recycling is prioritized. Moreover, management structures and strategic planning tools, including the presence of dedicated sustainability units and approved operational budgets; are critical to sustaining recycling initiatives. These internal processes are frequently cited as the differentiating factor between reactive compliance and proactive environmental management.

Technological capacity is another central determinant. Integrated Workplace Management Systems (IWMS) and water quality monitoring technologies are standard tools in advanced CREOs. However, their adoption in Nigeria is limited, often due to high costs and lack of local expertise. According to GRESB (2023), technology not only improves monitoring and reporting but also reduces long-term operating costs; yet these benefits remain underexploited in many Nigerian organizations due to financial constraints. A 2024 study by Reuters observed that in Sub-Saharan Africa, the willingness to adopt new technologies is high, but is often thwarted by regulatory uncertainty and inadequate incentives.

Public perception and institutional capacity are additional considerations. Research has shown that societal trust and acceptance of recycled water are crucial for its mainstreaming (Vrensen et al., 2022). In Nigeria, limited public awareness and safety concerns often undermine recycling programs. This places CREOs in a complex position: managing not only the technical operations of recycling systems but also the public communication and stakeholder engagement needed to ensure adoption and legitimacy.

Regulatory frameworks are also decisive. While Nigeria has made progress in environmental policy, enforcement remains weak. Inconsistent regulations and lack of coordinated water governance can discourage long-term investment by CREOs. As Deloitte (2024) notes, regulatory coherence and incentives are essential for scaling sustainable infrastructure solutions. In Nigeria, the absence of clear regulatory pathways for greywater reuse or incentives for green infrastructure has limited the ability of CREOs to expand water recycling beyond pilot levels.

Print ISSN: 2055-6578(Print)

Online ISSN: 2055-6586(online)

Website: https://www.eajournals.org/

Publication of the European Centre for Research Training and Development -UK

Despite these barriers, there is increasing evidence of institutional maturity among some Nigerian CREOs, especially those operating in industrial clusters like Lagos, Ogun, and Oyo States. These organizations demonstrate relatively higher levels of integration, budgeting for sustainability, and openness to innovation. They also tend to benefit from economies of scale, access to external consultancy support, and closer ties to international reporting frameworks such as ISO 14001 or GRESB. These characteristics align with findings in the reviewed article, where experience duration, budget allocation, and leadership commitment emerged as key enabling factors.

In conclusion, aligning the literature on CREOs with the specific focus on water recycling in Nigeria reveals both universal themes and localized nuances. CREOs globally are undergoing transformation as sustainability and technological imperatives redefine their roles. In Nigeria, this transformation is underway but constrained by systemic issues such as regulatory fragmentation, limited funding, and technical skill shortages. Nevertheless, where management processes are clearly defined, budgets are allocated, and environmental awareness is high, CREOs in Nigeria are showing potential to lead in water recycling innovation. Future research and policy should focus on strengthening institutional capacity, aligning regulations, and providing financial and technical incentives to support these organizations in achieving water sustainability goals.

2.2 Water Recycling and Corporate Real Estate

Water recycling refers to the process of treating wastewater to make it reusable for non-potable or, in some cases, potable purposes (Chong et al., 2013). In corporate real estate facilities, recycled water is often used for landscaping, toilet flushing, cooling systems, and industrial operations (Jiménez & Asano, 2008). Globally, water recycling is recognised as an effective means of reducing the demand for freshwater, lowering operational costs, and mitigating environmental impacts (Sharma et al., 2013). In Nigeria, however, the concept of water recycling in corporate facilities is still at a nascent stage. Studies show that most corporate organisations continue to rely on boreholes and municipal water supply, which are becoming increasingly unreliable due to depletion and urban demand (Olalekan et al., 2019; Adewumi et al., 2020).

The corporate real estate sector, being a significant consumer of water, plays a vital role in implementing sustainable water strategies. As highlighted by Akinbile and Yusoff (2012), the adoption of water recycling technologies in such facilities could help address both economic and environmental concerns by reducing operational costs and ensuring a reliable water supply. Yet, the limited availability of infrastructure, low awareness, and financial constraints often hinder the

Print ISSN: 2055-6578(Print)

Online ISSN: 2055-6586(online)

Website: https://www.eajournals.org/

Publication of the European Centre for Research Training and Development -UK

integration of water recycling systems in commercial real estate projects across Nigeria (Nnaji & Mama, 2014).

Management Processes of Water Recycling Facilities

The effective functioning of water recycling systems depends largely on robust management processes, which encompass planning, operation, monitoring, maintenance, and evaluation (Mokhtar et al., 2016). Good management ensures that recycling plants operate efficiently and produce water of adequate quality for reuse. Effective processes involve regular maintenance schedules, skilled personnel, and compliance with environmental and public health standards (Odeyemi et al., 2021). Globally, best practices in managing water recycling facilities include adopting advanced treatment technologies, implementing monitoring systems to ensure water quality, and developing policies for continuous improvement (Gleick, 2014). In corporate real estate contexts, this translates into facility managers overseeing water recycling operations as part of integrated facilities management strategies (Atkin & Brooks, 2015). However, studies in Nigeria have reported weak management processes, often due to poor technical expertise, inadequate funding, and the absence of formal guidelines for water recycling (Adewumi et al., 2020; Oyebode & Adebayo, 2021). Additionally, the lack of regular monitoring and quality assurance leads to underperformance of recycling facilities, with some plants becoming redundant after installation (Uche & Ogbonna, 2017).

2.4 Determinants of Water Recycling Facility Management

The management of water recycling facilities in corporate real estate is influenced by a combination of technical, organisational, economic, regulatory, and social factors. The type of technology used, availability of spare parts, and the technical expertise of personnel significantly influence the success of water recycling initiatives (Chong et al., 2013). Facilities with advanced treatment technologies and trained operators are more likely to function effectively. However, studies in Nigeria have highlighted a lack of local technical capacity, which leads to frequent system breakdowns (Nnaji & Mama, 2014). The structure and efficiency of corporate real estate organisations also play a role. Well-structured organisations with defined responsibilities for facility management tend to have better water recycling outcomes. Leadership support and corporate policies geared toward sustainability further enhance the adoption and management of recycling systems (Atkin & Brooks, 2015). Cost is one of the most critical determinants. The initial

Print ISSN: 2055-6578(Print)

Online ISSN: 2055-6586(online)

Website: https://www.eajournals.org/

Publication of the European Centre for Research Training and Development -UK

capital investment required for installing water recycling plants is often high, which discourages many corporate organisations from adopting the technology (Olalekan et al., 2019). Furthermore, inadequate budget allocation for maintenance and operation has been cited as a major challenge in Nigeria (Oyebode & Adebayo, 2021). A weak regulatory environment also undermines water recycling practices. While developed nations have clear policies and incentives for water reuse, Nigeria lacks comprehensive guidelines for promoting and monitoring water recycling in corporate facilities (Adewumi et al., 2020). Institutional support, in terms of training, awareness campaigns, and subsidies, is also limited. Public perception and environmental concerns about water recycling can affect its adoption. Misconceptions regarding the safety of recycled water have been reported as barriers to its use, particularly in commercial settings (Sharma et al., 2013). Additionally, environmental factors such as water availability, urbanization rates, and pollution levels influence the need and urgency for water recycling (Olalekan et al., 2019). While several studies have explored water recycling in residential and municipal contexts, there is a dearth of research focusing on the corporate real estate sector in Nigeria. Few empirical studies have examined the management processes of water recycling facilities or the factors influencing their efficiency within commercial environments. This gap necessitates a more focused investigation into how corporate real estate organisations manage water recycling facilities, as well as the determinants of their success or failure.

METHODOLOGY

This study employed a descriptive survey research design to evaluate the management processes and determinants of water recycling facilities in corporate real estate organisations. The research focused on Lagos, Ogun, and Oyo States, southwestern Nigeria, due to their high concentration of corporate estates and industrial complexes where water recycling practices are emerging as a response to urban water scarcity and rising operational costs. A purposive sampling technique was used to identify corporate real estate organisations with functional water recycling facilities. A total of 15 organisations were selected, representing the target population for the study. Data were collected through a structured questionnaire designed to capture information on the management processes of water recycling facilities, and regulatory factors influencing their management. Data analysis involved the use of descriptive statistics (frequencies, means, percentages, and RII) to summarise responses, while factor analysis was employed to examine the factors influencing their facility management. The study is scoped to Lagos, Ogun, and Oyo States, and its findings are specific to the corporate real estate organisations operating water recycling facilities in these locations.

Print ISSN: 2055-6578(Print)

Online ISSN: 2055-6586(online)

Website: https://www.eajournals.org/

Publication of the European Centre for Research Training and Development -UK

RESULTS AND FINDINGS

This section presents the findings from the survey of 15 corporate real estate organisations with functional water recycling facilities in Lagos and Ogun States. The analysis focuses on the management processes employed by these organisations and the factors influencing the performance of their facilities. Both descriptive statistics and the Relative Importance Index (RII) were used to evaluate the data.

Table 1: Demographic Profile of the Organizations

Variables	Parameters	N	Percentage
Ownership Type of Organization	Privately Owned	13	86.7
	Government Owned	0	0
	Public-private Partnership	2	13.3
	Total	15	100
Number of Employees	<50	9	60
	51-60	5	33.3
	61-70	1	6.7
	>70	0	0
	Total	15	100
Operational Scale of Organization	Local	10	66.7
	Regional	5	33.3
	National	0	0
	International	0	0
	Total	15	100
Organization Current Location	Lagos	2	13.3
	Ogun	9	60
	Oyo	4	26.7
	Osun	0	0
	Ondo	0	0
	Ekiti	0	0
	Total	15	100
Length of Experience in Water Recycling	<2	0	0
	2-5	0	0
	6-10	11	73.3

Print ISSN: 2055-6578(Print)

Online ISSN: 2055-6586(online)

Website: https://www.eajournals.org/

Publication of the European Centre for Research Training and Development -UK

	More than 10 years	4	26.7
	Total	15	100
Purpose of Water Recycling	Industrial Use	13	86.7
	Agricultural Use	0	0
	Municipal Use	0	0
	Environmental Use	2	13.3
	Total	15	100
Type of Wastewater Recycle	Industrial Wastewater	3	20
	Domestic Wastewater	12	80
	Agricultural Wastewater	0	0
	All of the above	0	0
	Total	15	100

Source: Author's Field Survey, 2025

The analysis of Table 4.3 reveals that water recycling in the study area is primarily driven by small to medium-sized, privately owned enterprises, with 86.7% being private and the rest operating under public-private partnerships, none are fully government-owned. These organizations typically operate at local or regional levels, with no national presence, reflecting the localized nature of water resource management. Most are based in Ogun and Oyo States, indicating regional policy and infrastructure advantages. The sector is relatively mature, with all organizations having more than six years of experience, and the primary motivation for recycling is industrial reuse of domestic wastewater. Agricultural and municipal recycling, as well as industrial wastewater treatment, is notably absent, likely due to policy or technological constraints. This pattern underscores the need for expanded government involvement, integrated policy frameworks, and cross-sectoral engagement to enhance the sustainability and reach of water recycling initiatives in Nigeria.

Print ISSN: 2055-6578(Print)

Online ISSN: 2055-6586(online)

Website: https://www.eajournals.org/

Publication of the European Centre for Research Training and Development -UK

Table 2: Management of Water Recycling Facilities of Corporate Organizations in the Study Area

S/N	Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total Weighted Opinion	Total Responses	Mean	RII
1	There is a dedicated team or personnel responsible for managing the water recycling facility.	3	0	3	5	4	52	15	3.47	0.693
2	The organization has a clear policy or guideline on water recycling.	2	1	5	4	3	50	15	3.33	0.667
3	There is an approved budget specifically for the management and maintenance of the recycling facility.	5	2	4	3	1	38	15	2.53	0.507
4	Roles and responsibilities in the facility's management are clearly defined.	2	2	4	6	1	47	15	3.13	0.627
5	The management ensures compliance with environmental and water management regulations.	4	5	1	2	3	40	15	2.67	0.533

Print ISSN: 2055-6578(Print)

Online ISSN: 2055-6586(online)

Website: https://www.eajournals.org/

Publication of the European Centre for Research Training and Development -UK

6	The facility operates based on a documented routine and schedule.	3	3	2	2	5	48	15	3.2	0.64
7	Operational decisions are guided by data and water quality monitoring.	6	4	0	1	4	38	15	2.53	0.507
8	The organization regularly upgrades or improves its recycling systems when needed.	5	6	0	3	1	34	15	2.27	0.453
9	Equipment and technology used in the recycling process are adequate and up to standard.	1	4	2	5	3	50	15	3.33	0.667
10	Staff involved in operating the facility receives adequate training.	3	3	2	4	3	46	15	3.07	0.613
11	The facility undergoes periodic maintenance checks.	4	4	3	2	2	39	15	2.6	0.52
12	Faults or breakdowns in the recycling system are promptly attended to.	4	3	3	4	1	40	15	2.67	0.533

Print ISSN: 2055-6578(Print)

Online ISSN: 2055-6586(online)

Website: https://www.eajournals.org/

Publication of the European Centre for Research Training and Development -UK

13	Water quality tests are conducted regularly after recycling	4	2	4	3	2	42	15	2.8	0.56
14	There is a system in place to monitor the quantity of water recycled.	4	5	2	1	3	39	15	2.6	0.52
15	External audits or inspections of the facility are occasionally conducted.	4	3	3	2	3	42	15	2.8	0.56
16	The recycling facility adequately meets the organization's non-potable water needs.	4	1	4	2	4	46	15	3.07	0.613
17	The management system contributes to reduced water bills and operating costs.	3	1	3	3	5	51	15	3.4	0.68
18	Recycled water is efficiently reused within the organization.	4	3	2	3	3	43	15	2.87	0.573
19	Management has set measurable performance targets for the facility.	5	2	4	1	3	40	15	2.67	0.533

Print ISSN: 2055-6578(Print)

Online ISSN: 2055-6586(online)

Website: https://www.eajournals.org/

Publication of the European Centre for Research Training and Development -UK

20	The current management system ensures optimal performance of the facility.	1	2	3	7	2	52	15	3.47	0.693
21	Lack of skilled personnel affects the management of the facility.	2	1	4	6	2	50	15	3.33	0.667
22	Inconsistent government regulations pose challenges to effective management.	2	3	4	4	2	46	15	3.07	0.613
23	Inadequate funding limits the proper operation and management of the facility.	2	3	4	6	0	44	15	2.93	0.587
24	There is a plan in place to improve the management of the recycling facility.	8	3	2	2	0	28	15	1.87	0.373
25	The organization is open to adopting new technologies for better facility management.	3	2	1	1	8	54	15	3.6	0.72

Authors Field Work, 2025

Print ISSN: 2055-6578(Print)

Online ISSN: 2055-6586(online)

Website: https://www.eajournals.org/

Publication of the European Centre for Research Training and Development -UK

Table 2 reveals mixed perceptions of organisational commitment to water recycling, highlighting partial implementation of formal structures and operational practices. While some organisations have dedicated personnel (RII=0.693) and policies (RII=0.667), critical areas such as budgeting (RII=0.507), data-driven decision-making (RII=0.507), and regular upgrades (RII=0.453) show notable deficiencies. Moderate scores in staff training (RII=0.613), maintenance routines, and external audits (RII=0.56) point to ongoing but incomplete capacity-building efforts. Despite these operational gaps, many organisations recognise cost-saving benefits from water recycling, as seen in relatively higher scores for perceived performance and reduced water bills. However, structural barriers, such as inadequate funding, inconsistent regulations, and skills shortages, remain significant. Most concerning is the very low RII (0.373) for having a strategic plan to improve facility management, though openness to adopting new technologies (RII=0.72) offers a potential entry point for reform. Overall, the findings stress the need for a more strategic, well-funded, and data-informed management approach to realise the full environmental and economic benefits of water recycling.

Table 3: Determinants of Water Recycling Facilities in the Study Area

	Component							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Government policies and mandates	.580							
Compliance and monitoring frameworks							.883	
Penalties for non-compliance							.865	
Licensing and permits							.539	
Support from local authorities								
Local water scarcity								
Drought/climate change	.620							
Pollution reduction goals	.806							
Ecological conservation concerns	.780							
Flood and stormwater management	.748							
Initial investment cost	.671							
Operation and maintenance costs	.711							
Availability of subsidies/incentives	.589							
Return on investment				.567				
Cost of conventional water supply				.690				
Availability of technology				.647				
Infrastructure for treatment/storage								.789
Skilled workforce								.588
Maintenance requirements								

Water quality monitoring systems					
Management's commitment to sustainability					.501
Staff training and development					.684
Organisational environmental policy					.657
Awareness of environmental impact					.536
Frequency of system upgrades				.604	
Public perception of recycled water				.719	
Health and safety regulations				.599	
Wastewater characteristics (effluent quality)					
Risk management protocols	.691				
Partnership with environmental NGOs	.730				
Internal performance monitoring tools	.790				
Water reuse education initiatives	.768				
External consultancy support	.701				
Organizational culture and innovation	.532				
Industry best practices and benchmarks		.581			
Integration with existing water systems		.628			
Level of automation in facility operations		.687			
Ease of access to spare parts and components		.666			
Employee attitude and compliance behaviour		.550			
Data availability for informed decision-making		.583			

Authors Field Work, 2025

The rotated component matrix in Table 4.12 reveals eight distinct thematic factors influencing water recycling facility management, each reflecting significant variable loadings (≥ 0.5). Component 1, *Environmental and Regulatory Concerns*, captures ecological and climate-related drivers such as pollution reduction and conservation imperatives. Component 2, *Regulatory Enforcement and Compliance*, centers on legal obligations and monitoring mechanisms that shape organizational behavior. Component 3, *Financial and Investment Considerations*, includes variables tied to costs and economic incentives, highlighting financial feasibility as a determinant of technology adoption. Component 4, *Technological Infrastructure*, reflects access to technology and its comparative advantage over traditional water supply. Component 5, *Institutional Capacity and Expertise*, underscores the role of infrastructure and skilled personnel in implementation success. Component 6, *Organisational Policy and Culture*, focuses on internal governance, training, and environmental awareness. Component 7, *Public Perception and Safety Regulations*, emphasizes the importance of societal attitudes and safety compliance. Lastly, Component 8, *Operational Efficiency and Strategic Monitoring*, points to the need for performance oversight, risk protocols, and educational initiatives. These groupings align with broader literature on

Print ISSN: 2055-6578(Print)

Online ISSN: 2055-6586(online)

Website: https://www.eajournals.org/

Publication of the European Centre for Research Training and Development -UK

sustainable water management and stress the importance of integrated strategies involving policy, finance, infrastructure, and public engagement.

DISCUSSIONS OF FINDINGS

The study examined 15 organizations involved in water recycling. The majority (86.7%) is privately owned, while 13.3% operate through public-private partnerships (PPPs); no government-owned entities were included. Most organizations (60%) employ fewer than 50 staff, and none employ more than 70, indicating dominance by small and medium-sized enterprises (SMEs). A local or regional operational scope is prevalent (66.7% and 33.3%, respectively), with no national-scale operations. Geographically, most organizations are located in Ogun (60%) and Oyo (26.7%) States, with Lagos contributing 13.3%. Most have operated in water recycling for 6–10 years (73.3%) or more than 10 years (26.7%), showing sectoral maturity. Primary water recycling motivation is industrial use (86.7%), with only 13.3% recycling for environmental reasons. There is no reported use for agricultural or municipal purposes. This focus on industrial application aligns with findings by Gude (2011), who asserts that industries are among the largest consumers and polluters of water resources, making them natural targets for recycling interventions.

Domestic wastewater is the main source (80%), while 20% use industrial wastewater. No organization recycles agricultural wastewater. Regarding organizational commitment, the presence of dedicated recycling personnel scored an RII of 0.693, and existence of a recycling policy scored 0.667. However, approved budgeting for recycling scored low (RII=0.507), as did system upgrades (RII=0.453) and use of water quality data for decisions (RII=0.507). This suggests limited dedicated financial planning, which aligns with earlier research by Marlow et.al (2013) noting that financial constraints often hinder the effectiveness of environmental management systems in developing economies

Staff training scored 0.613, while periodic maintenance and prompt repairs scored 0.52 and 0.533, respectively. Water quality testing and external audits both scored 0.56, while water quantity monitoring was low at 0.52. Performance perceptions were more positive: system performance rated 0.693 and cost-reduction benefits rated 0.68. Yet, skills shortages (RII=0.667), inconsistent regulations (RII=0.613), and inadequate funding (RII=0.587) remain challenges. Alarmingly, strategic planning scored just 0.373, although willingness to adopt new technologies rated the highest at 0.72. Factor analysis identified eight components: (1) Environmental and regulatory concerns, (2) Regulatory enforcement and compliance, (3) Financial and investment

considerations, (4) Technological infrastructure, (5) Institutional capacity and expertise, (6) Organisational policy and culture, (7) Public perception and safety regulations, and (8) Operational efficiency and strategic monitoring. These groupings highlight the multifaceted nature of water recycling management and the need for integrated investment, regulation, and policy responses.

CONCLUSION AND RECOMMENDATIONS

This study examined the management processes and determinants of water recycling facilities in corporate real estate organisations within Lagos and Ogun States, Nigeria. The findings reveal that while some organisations have developed structured management processes, including regular technical inspections and systematic record-keeping, several gaps persist. Preventive maintenance practices remain inconsistent, and staff training on water recycling operations is often insufficient. Furthermore, the study identified technical expertise, financial resources, and regulatory support as the most critical factors influencing the performance and sustainability of these facilities. These findings underscore the challenges faced by corporate organisations operating within a context of limited institutional frameworks, high operational costs, and inadequate access to advanced water treatment technologies.

The study highlights the urgent need for enhanced capacity building. Regular training programs and technical workshops are essential to equip facility managers and operational staff with the knowledge and skills required to maintain and optimise water recycling systems. A shift towards preventive maintenance, supported by structured schedules and the use of modern diagnostic tools, is also crucial for reducing downtime and extending the lifespan of facility components. Adequate financial planning and budgeting are equally important; corporate organisations must prioritise investments in system upgrades and innovative water management solutions.

From a policy perspective, government agencies have a vital role to play in creating an enabling environment. Clear policies, regulatory guidelines, and incentives; such as tax reliefs or subsidies, could encourage wider adoption of water recycling technologies in corporate real estate. Additionally, organisations should invest in stakeholder engagement initiatives to improve awareness and acceptance of recycled water, addressing negative perceptions that may hinder its use. Overall, this study emphasises that sustainable water recycling in corporate real estate requires a combination of skilled management, proactive maintenance, financial commitment, and supportive government policies. By addressing these critical factors, corporate organisations in

Print ISSN: 2055-6578(Print)

Online ISSN: 2055-6586(online)

Website: https://www.eajournals.org/

Publication of the European Centre for Research Training and Development -UK

Nigeria can not only achieve operational efficiency but also contribute significantly to environmental sustainability and the attainment of global water security goals.

REFERENCES

Adewumi, I., Ogunleye, A. O., and Omotola, J. (2020). Water reuse practices and challenges in Nigeria. *Environmental Management and Sustainability Journal, 9*(2), 12–24.

Akinbile, C. O., and Yusoff, M. S. (2012). Environmental impact of leachate pollution on groundwater supplies in Akure, Nigeria. *International Journal of Environmental Science and Development, 3*(3), 252–259.

Atkin, B., and Brooks, A. (2015). *Total facility management* (4th ed.). Wiley-Blackwell.

Chan, D. W., and Kumaraswamy, M. M. (2002). Compressing construction durations: Lessons learned from Hong Kong building projects. *International Journal of Project Management, 20*(1), 23–35.

Chong, M. N., Sharma, A. K., Burn, S., and Saint, C. P. (2013). Feasibility study on the application of advanced water treatment processes for water recycling in high-rise buildings. *Desalination, 308*, 79–88.

Deloitte. (2024). *Building an integrated approach to sustainable real estate*. https://www2.deloitte.com

Financial Executives International. (2023). *5 ways ESG could impact corporate real estate*. https://www.financialexecutives.org

Gleick, P. H. (2014). Water, drought, climate change, and conflict in Syria. *Weather, Climate, and Society, 6*(3), 331–340.

GRESB. (2023). *Global ESG benchmark for real assets*. https://www.gresb.com

Gude, V. G. (2011). Energy and water autonomy in sustainable water infrastructure. *Renewable and Sustainable Energy Reviews, 14*(9), 2641–2654.

Jiménez, B., & Asano, T. (2008). *Water reuse: An international survey of current practice, issues and needs*. IWA Publishing.

Marlow, D. R., Moglia, M., Cook, S., and Beale, D. J. (2013). Towards sustainable urban water management: A critical reassessment. *Water Research, 47*(20), 7150–7161.

Mokhtar, M., Aziz, N., and Ghani, A. A. (2016). Water reuse and recycling for sustainable water resource management. *Journal of Environmental Management, 181*, 197–204.

Nnaji, C., and Mama, N. (2014). Public perception and willingness to reuse wastewater in Nigeria. *Journal of Water Reuse and Desalination, 4*(1), 19–28.

Odeyemi, O., Alade, A., and Ogunbiyi, T. (2021). Wastewater management practices in urban areas of Nigeria. *Journal of Environmental Engineering, 147*(6), 04021026.

Olalekan, R. M., Adedoyin, O. A., and Babatunde, A. B. (2019). Sustainable water management in Nigeria: The role of water reuse and recycling. *Sustainable Water Resources Management, 5*(4), 1839–1851.

Oyebode, O., and Adebayo, R. (2021). Challenges of water supply and wastewater recycling in Nigeria. *Water Practice and Technology, 16*(3), 657–666.

Reuters. (2024). UK landlords bet on green offices as tenants get pickier. https://www.reuters.com

Print ISSN: 2055-6578(Print)

Online ISSN: 2055-6586(online)

Website: https://www.eajournals.org/

Publication of the European Centre for Research Training and Development -UK

Sharma, A., Burn, S., Gardner, T., and Gregory, A. (2013). Role of decentralised systems in the transition of urban water systems. *Water Science and Technology, 67*(9), 2093–2101.

Sireas. (2024). *The evolution of corporate real estate strategy*. https://www.sireas.com

Uche, I. I., and Ogbonna, J. O. (2017). Adoption of wastewater recycling technologies in Nigeria: Challenges and opportunities. *Nigerian Journal of Technology, 36*(2), 560–567.

Vrensen, H., Jang, K., and Goodman, P. (2022). The role of ESG in commercial real estate. *Journal of Property Investment & Finance, 40*(2), 89–108.