

# Evaluating the Effects of Facilities Management Costs on Real Estate Investment Decisions in Lagos Island

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*Abstract- Facilities management (FM) costs constitute an important component of the operating expenses of commercial and high-density residential real estate and may significantly influence net operating income, investment returns, asset values, and long-term investment performance. In Lagos Island, Nigeria, persistent inflation, exchange-rate volatility, energy challenges, infrastructure deficits, and the increasing cost of maintaining technologically complex buildings have intensified the financial burden associated with property operations. Consequently, investors and asset managers are increasingly required to consider operational expenditure alongside acquisition cost, rental income, capital appreciation, and other conventional investment indicators. This study evaluated the effects of facilities management costs on real estate investment decisions in Lagos Island, Nigeria. The study adopted a cross-sectional descriptive and analytical survey design. Data were obtained from 182 practicing Estate Surveyors and Valuers, facilities management professionals, institutional real estate asset managers, and corporate property portfolio managers using structured questionnaires and property financial audit schedules. Descriptive statistics, including frequencies, percentages, mean scores, and standard deviations, were used to summarize the data, while Pearson product-moment correlation and simple linear regression analyses were employed to test the study hypotheses. The findings revealed a statistically significant negative relationship between the facilities management cost ratio and net real estate investment returns ( $r = -.684, p < .001$ ). The regression analysis further indicated that the facilities management cost ratio significantly predicted real estate investment decision outcomes, explaining approximately 52.8% of the observed variance in the investment decision score ( $R^2 = .528, F(1, 180) = 201.34, p < .001$ ). The findings also identified energy and power generation, mechanical and electrical maintenance, and security services as major components of facilities management expenditure. Furthermore, the study highlights the potential role of building automation and Computerized Maintenance Management Systems (CMMS) in*

*improving operational efficiency and supporting systematic cost management. The study concludes that rising facilities management costs can adversely affect real estate investment performance and influence investors' decisions regarding asset retention, reinvestment, upgrading, and divestment. It recommends the adoption of life-cycle costing, improved service-charge management, energy-efficiency strategies, building automation, CMMS, and more comprehensive operational cost analysis during real estate investment appraisal. These measures may improve the long-term financial sustainability and resilience of commercial property investments in Lagos Island.*

*Keywords: facilities management costs; real estate investment decisions; Lagos Island; net operating income; investment returns; life-cycle costing; building automation; Computerized Maintenance Management Systems.*

## I. INTRODUCTION

Real estate investment decisions are fundamentally influenced by expectations regarding income generation, capital appreciation, risk, liquidity, and the long-term sustainability of asset performance. Although investors often concentrate on acquisition cost, rental income, capitalization rates, and anticipated appreciation, the operational performance of a property is equally important because it determines the extent to which gross income can be converted into sustainable net returns. The difference between gross rental income and the expenses required to operate, maintain, secure, repair, and manage a property is therefore central to the financial performance of real estate assets. Facilities management has increasingly developed beyond its traditional perception as a maintenance-oriented support activity. Contemporary facilities management involves the coordinated management of people,

processes, technology, services, and the physical environment in order to support organizational and asset objectives. International facilities management standards emphasize the importance of effective and efficient facilities management in supporting organizational performance, sustainability, stakeholder requirements, and value creation (International Organization for Standardization [ISO], 2018). For income-producing real estate, facilities management has a direct connection with investment performance. Property investors do not merely acquire physical buildings; they acquire long-term streams of expected benefits and financial obligations. The quality and cost of facilities management influence the reliability of building systems, tenant satisfaction, energy consumption, maintenance requirements, asset deterioration, and ultimately net operating income. Consequently, increases in operational expenditure may reduce investment returns even where nominal rental income remains relatively stable.

The importance of operational expenditure is particularly significant in developing metropolitan environments where infrastructure deficiencies transfer substantial costs from public systems to private property owners and occupiers. Lagos Island represents one of the most economically significant commercial locations in Nigeria. The area contains major commercial districts and institutional activities, including office developments, financial institutions, commercial complexes, high-density residential developments, and other income-producing properties. However, operating real estate assets within this environment presents substantial challenges. Among the most significant challenges is the cost of energy. In circumstances where public electricity supply is unreliable or insufficient, property owners and occupiers may depend on alternative power sources. This dependence increases the cost of fuel, generator maintenance, electrical infrastructure, and energy management. Mechanical and electrical systems, elevators, air-conditioning systems, security infrastructure, water systems, and other building services also require continuous maintenance. These conditions can create significant operational expenditure, particularly in technologically complex or high-rise properties.

Macroeconomic instability further compounds these challenges. Inflation, exchange-rate movements, and changes in the prices of imported equipment and spare parts may substantially affect the cost of maintaining buildings. Agava and Gamu (2024) demonstrate the importance of macroeconomic conditions in shaping real estate investment returns in Lagos and Abuja. Because many facilities management inputs depend directly or indirectly on energy markets, imported materials, technology, and specialized technical services, changes in macroeconomic conditions may create substantial uncertainty in operating budgets.

The consequences of rising FM costs extend beyond accounting considerations. Where operational costs increase more rapidly than rental income or service-charge recovery, the financial performance of the property may deteriorate. Investors may respond by postponing capital expenditure, increasing service charges, reducing services, introducing new technologies, restructuring leases, retaining assets with lower returns, or ultimately considering divestment. Thus, facilities management costs may influence not only annual operating performance but also strategic investment decisions. The increasing recognition of life-cycle costing has strengthened the argument that real estate decisions should not be based exclusively on initial capital expenditure. A property with a lower acquisition or development cost may generate higher long-term maintenance and operational expenses. Conversely, investments in efficient systems, automation, preventive maintenance, and energy management may require higher initial expenditure while reducing costs during the operational life of the asset. Life-cycle costing therefore provides a broader framework for evaluating the total financial implications of real estate investment decisions over time.

The increasing complexity of modern buildings has also encouraged the adoption of digital facilities management technologies. Building automation systems can assist in monitoring and controlling energy-consuming systems, while Computerized Maintenance Management Systems can improve maintenance scheduling, record keeping, asset monitoring, and preventive maintenance planning.

Research conducted in Lagos has identified the relevance of automation to the management of high-rise buildings and has emphasized operational efficiency and system performance as important considerations in technology adoption (Awosode & Ajayi, 2019, 2023, 2024). Similarly, Musa et al. (2021) examined CMMS deployment within high-rise office buildings and highlighted the importance of systematic maintenance management. Despite the growing importance of operational costs, a substantial proportion of real estate investment analysis continues to focus primarily on capital value, development finance, rental growth, and market yields. There remains a need for empirical evidence demonstrating how facilities management cost variations influence investment returns and strategic investment decisions in specific urban markets. This study addresses that need by examining the effects of facilities management costs on real estate investment decisions in Lagos Island, Nigeria.

## II. STATEMENT OF THE PROBLEM

Prime commercial real estate investments are generally expected to generate stable income and preserve or increase capital value over time. However, the financial viability of an income-producing property depends not only on the revenue generated but also on the costs required to sustain the asset. In Lagos Island, escalating facilities management costs have created increasing pressure on property owners, managers, investors, and occupiers. Non-recoverable operational costs, service-charge shortfalls, energy expenditure, emergency repairs, and the maintenance of aging building systems can erode the financial benefits associated with rental income. Where such costs are not adequately anticipated, investors may experience lower-than-expected net operating income and weaker investment performance. The problem is particularly significant in high-density and high-rise properties, where the operation of elevators, air-conditioning systems, electrical installations, security systems, water facilities, and other technical services requires continuous expenditure. Awosode and Ajayi (2023, 2024) demonstrate the growing relevance of automation and technological systems in facilities management of high-rise buildings in Lagos.

However, the initial capital required for technological adoption and the technical capacity necessary for effective implementation may discourage some investors from adopting these systems. Another important challenge concerns the relationship between property managers and tenants. Increases in facilities management expenditure may result in higher service charges. Where tenants are unable or unwilling to absorb these increases, service-charge recovery may become difficult. Insufficient recovery may subsequently result in deferred maintenance, reduced service quality, and progressive physical deterioration. These outcomes may reduce tenant satisfaction and, in the longer term, weaken the competitiveness and attractiveness of the property. The consequences of rising FM costs are therefore multidimensional. They affect current income, maintenance quality, tenant relations, investment valuation, capital expenditure decisions, and long-term asset strategy. Nevertheless, empirical research within the Nigerian real estate literature has more frequently emphasized valuation, development finance, housing, property market performance, and macroeconomic factors than the direct quantitative relationship between facilities management costs and investment decisions. A specific empirical gap therefore exists regarding the extent to which variations in facilities management cost ratios influence investor decisions relating to property retention, reinvestment, upgrading, technological adoption, and divestment within Lagos Island. This study addresses that gap by examining both the composition of FM costs and their statistical relationship with investment returns and strategic investment decision outcomes.

## III. AIM AND OBJECTIVES OF THE STUDY

The primary aim of this study is to evaluate the operational and strategic effects of facilities management costs on real estate investment decisions in Lagos Island, Lagos State, Nigeria.

The specific objectives are to:

1. examine the composition and magnitude of facilities management costs relative to gross rental income across commercial properties in Lagos Island;

2. assess the impact of escalating facilities management costs on net return on investment and property investment performance;
3. evaluate the effect of facilities management cost variations on institutional real estate investment decisions, including holding, capital injection, technological upgrading, and divestment; and
4. examine the perceived efficacy of building automation systems and Computerized Maintenance Management Systems in mitigating facilities management cost overruns in high-density commercial assets.

#### IV. RESEARCH QUESTIONS

The study was guided by the following research questions:

1. What is the composition and relative proportion of facilities management costs in relation to gross rental income in Lagos Island commercial real estate?
2. How do escalating facilities management costs affect the net return on investment generated by commercial real estate assets in Lagos Island?
3. To what extent do facilities management cost variations influence real estate investors' decisions to retain, upgrade, reinvest in, or divest commercial property assets?
4. How does the adoption of automated facility systems and CMMS technology contribute to the management of operational facility costs in high-density commercial assets?

#### V. RESEARCH HYPOTHESES

The following hypotheses were formulated for statistical testing:

H<sub>0</sub>: Facilities management cost ratios do not have a significant effect on real estate investment returns and portfolio reinvestment or divestment decisions in Lagos Island.

H<sub>1</sub>: Facilities management cost ratios have a significant effect on real estate investment returns

and portfolio reinvestment or divestment decisions in Lagos Island.

#### VI. SIGNIFICANCE OF THE STUDY

This study has practical, academic, and policy relevance.

First, the findings provide Estate Surveyors, Valuers, Facility Managers, and property managers with empirical evidence concerning the relationship between operational costs and investment outcomes. Such information may support more realistic service-charge budgeting, maintenance planning, life-cycle costing, and investment appraisal.

Second, institutional investors and property developers may benefit from the study because it emphasizes the importance of considering long-term operational expenditure alongside initial capital expenditure. Investment decisions that focus exclusively on acquisition or development cost may underestimate the future financial burden associated with operating technologically complex buildings.

Third, the study provides information relevant to professional bodies and industry stakeholders involved in real estate and facilities management. Improved operational reporting and standardized facilities cost benchmarking could strengthen transparency and improve decision-making within the Nigerian property industry.

Finally, the study contributes to academic literature by connecting facilities management with real estate investment performance. This relationship is particularly important in emerging markets, where infrastructure constraints and macroeconomic volatility may create a stronger connection between operational costs and investment decisions than is apparent in more stable property markets.

#### VII. LITERATURE REVIEW

##### Concept of Facilities Management

Facilities management is a multidisciplinary field concerned with the coordinated management of physical assets, workplace services, technology, people, and organizational processes. Its purpose

extends beyond maintaining buildings in functional condition. Strategic facilities management seeks to ensure that the built environment contributes to organizational effectiveness, sustainability, productivity, and value creation. ISO (2018) conceptualizes facilities management within a management-system framework that supports effective and efficient service delivery and organizational objectives. This perspective is particularly relevant to real estate investment because the performance of the physical asset affects both users and investors. A poorly maintained property may experience higher operating costs, reduced tenant satisfaction, accelerated depreciation, and diminished competitiveness.

Facilities management activities commonly include maintenance, energy management, security, cleaning, waste management, space management, health and safety, building systems operation, and technology-supported asset management. The composition of FM expenditure varies according to property type, building age, design complexity, occupancy intensity, location, and the quality of public infrastructure. For commercial real estate, FM should therefore be viewed as a value-related function rather than merely an expense category. Although some FM expenditure is unavoidable, ineffective management may increase unnecessary costs. Conversely, appropriately planned expenditure may prevent more substantial future repair costs and preserve asset performance.

#### Facilities Management Costs and Real Estate Performance

Facilities management costs directly influence the financial performance of income-producing property. Net operating income represents the income available after relevant operating expenses have been deducted from gross property income. Consequently, increases in operating expenditure may reduce the income available to investors. This relationship is important because property values are frequently influenced by income-generating capacity. Where the market expects persistent increases in operating costs without corresponding increases in recoverable income, the anticipated net income stream may weaken. Investors may therefore demand higher

returns or discount the value they are willing to pay for the asset.

FM costs can also influence property competitiveness. Buildings with unreliable services, deteriorating infrastructure, inefficient energy systems, or inadequate security may experience difficulties in attracting or retaining tenants. Therefore, reducing FM expenditure indiscriminately may not always improve investment performance. Excessive cost reduction can lead to deferred maintenance and deterioration. The critical issue is therefore not simply minimizing expenditure but optimizing expenditure in a manner that supports long-term asset performance. Performance measurement research in facilities management also demonstrates the importance of developing systematic approaches to evaluating FM outcomes. Existing literature identifies fragmentation in performance indicators and the need for more integrated measurement approaches that connect operational activities with organizational outcomes. For real estate investors, this suggests that FM performance should be evaluated using both cost indicators and value-related outcomes.

#### Life-Cycle Costing Theory

Life-cycle costing provides the first major theoretical foundation for this study. The central proposition of life-cycle costing is that the economic consequences of an asset extend beyond its initial acquisition or development cost. A comprehensive assessment should consider the costs associated with operation, maintenance, repair, replacement, renewal, and eventual disposal. The relevance of this theory to real estate is substantial. Buildings are long-lived assets, and operational expenditure accumulates over extended periods. Decisions that reduce initial capital expenditure may increase future maintenance and operating costs. Conversely, investments in durable materials, energy-efficient systems, automation, and preventive maintenance may involve greater initial expenditure but reduce costs over the life of the asset. Recent life-cycle cost literature emphasizes the importance of evaluating real estate decisions from a long-term perspective rather than concentrating solely on initial investment cost. Whole-life analysis provides investors with a more comprehensive

understanding of the trade-offs between capital expenditure and operational expenditure. Within Lagos Island, life-cycle costing is particularly relevant because macroeconomic uncertainty can affect future maintenance costs. Exchange-rate changes, inflation, energy prices, and imported equipment costs create uncertainty regarding future expenditure. Consequently, investment appraisal should include sensitivity analysis and cost scenarios rather than relying exclusively on fixed assumptions.

#### Modern Portfolio Theory and Real Estate Investment Decisions

The second theoretical foundation is Modern Portfolio Theory, associated with Markowitz (1952). The theory emphasizes the relationship between risk and return and proposes that rational investors seek to optimize expected returns relative to the risks they are willing to assume. Although real estate differs from conventional financial securities in several important respects, the risk-return principle remains relevant. Real estate investors consider the stability of income, capital growth prospects, liquidity, market risk, and property-specific risks. Facilities management cost volatility represents an additional source of asset-specific risk because it may reduce expected cash flows and increase uncertainty. When operational costs rise unpredictably, the investor's expected net return may decline. The resulting uncertainty may influence decisions regarding capital allocation, reinvestment, diversification, or asset disposal. Thus, FM cost volatility can be interpreted as a component of operational risk within real estate portfolios.

The integration of Modern Portfolio Theory with life-cycle costing provides a useful analytical perspective for this study. Life-cycle costing explains the long-term structure of property costs, while portfolio theory explains why changes in those costs may influence investment decisions through their effects on expected returns and risk.

#### Macroeconomic Conditions and Operational Costs in Nigerian Real Estate

The operating environment of Nigerian real estate is influenced by broader economic conditions. Inflation can increase labour, materials, energy, and service

costs. Exchange-rate depreciation may increase the cost of imported mechanical and electrical components. Changes in interest rates may also affect the cost of financing capital improvements. Agava and Gamu (2024) demonstrate the relevance of macroeconomic variables to real estate investment returns in Nigeria. These factors are particularly important in cities such as Lagos, where property markets are deeply connected to national and international economic conditions.

For facilities management, macroeconomic instability may create difficulties in budgeting. Property managers may prepare annual budgets based on expected expenditure, only to experience substantial increases in fuel prices, spare-parts costs, or contractor charges. This creates a gap between budgeted expenditure and actual expenditure. Where lease agreements do not permit full recovery of these additional costs, property owners may bear a substantial financial burden. Even where service charges are theoretically recoverable, tenants may resist increases because their own business operations are affected by the same economic environment.

#### Energy Costs as a Major Component of Facilities Management Expenditure

Energy represents one of the most important operational cost categories in modern commercial property. Electricity is required for lighting, air-conditioning, information technology systems, elevators, pumps, security systems, and other building services. In locations where reliable public electricity is unavailable, additional expenditure may be required for alternative power generation. This can include fuel procurement, generator maintenance, replacement of equipment, and technical supervision. Consequently, energy costs may represent a disproportionately large share of the operating budget.

The findings of the present study indicate that energy and power generation constitute the largest component of FM expenditure within the sampled properties. This result demonstrates the importance of energy management as an investment concern rather than simply a technical issue. Energy-efficient systems, improved monitoring, automated controls,

and alternative energy strategies may reduce exposure to energy cost volatility. However, these interventions often require initial capital expenditure. Investors must therefore evaluate whether the expected long-term savings justify the initial investment.

#### Maintenance, Asset Deterioration, and Investment Value

Maintenance expenditure presents a complex challenge for property investors. Maintenance costs reduce current income, but inadequate maintenance can create more serious future financial consequences. Deferred maintenance may result in equipment failure, tenant dissatisfaction, emergency repairs, safety risks, and accelerated physical deterioration. Preventive maintenance seeks to reduce the likelihood of unexpected failures by undertaking planned inspections and interventions. Predictive maintenance further uses condition information and performance data to identify potential failures before they occur.

From an investment perspective, maintenance expenditure should therefore be evaluated in terms of its long-term consequences. The relevant question is not simply how much money is spent but whether the expenditure preserves asset functionality, reduces future risk, and protects investment value. Musa et al. (2021) emphasize the relevance of structured maintenance management through CMMS deployment. Digital maintenance systems may assist property managers in scheduling work, recording equipment histories, monitoring maintenance activities, and improving the availability of operational information.

#### Building Automation and Computerized Maintenance Management Systems

Building automation refers broadly to the use of technological systems to monitor and control building services. Such systems may be used to manage lighting, ventilation, air-conditioning, energy consumption, access control, and other operational functions. Awosode and Ajayi (2019, 2023) identify factors associated with the adoption of automation systems in the facilities management of high-rise buildings in Lagos. Their work demonstrates the

growing relevance of technological solutions to operational efficiency. Awosode and Ajayi (2024) further discuss the relevance of automation in facilities management within selected high-rise buildings in Lagos. Automation may contribute to improved monitoring and operational coordination, although successful adoption depends on technical capacity, capital availability, organizational commitment, and the characteristics of the building.

CMMS complements automation by focusing more directly on maintenance information and workflow. A CMMS can support the scheduling of maintenance activities, equipment inventories, work orders, maintenance histories, and performance monitoring. These functions can improve the quality of information available to property managers and investors. However, technology adoption should not be treated as an automatic solution. The effectiveness of automation and CMMS depends on the quality of implementation, staff competence, data management, maintenance culture, and organizational support. Investment decisions should therefore consider both acquisition costs and the organizational capacity required to achieve long-term benefits.

#### Empirical Gap

The literature demonstrates that facilities management influences organizational performance, building functionality, and operational efficiency. Life-cycle costing provides a framework for evaluating long-term costs, while portfolio theory emphasizes the importance of risk-adjusted returns. Research in Lagos has also considered automation and facilities management in high-rise buildings. However, there remains a need for empirical research directly linking the ratio of facilities management costs to investment returns and strategic investment decisions. This study contributes to that gap by quantitatively examining the relationship between FM cost ratios, investment returns, and investment decision outcomes in Lagos Island. The study therefore integrates facilities management and real estate investment perspectives within a specific Nigerian urban context.

## VIII. METHODOLOGY

### Research Design

This study adopted a cross-sectional descriptive and analytical survey design. The design was considered appropriate because the study sought both to describe the composition of facilities management costs and to examine the statistical relationship between FM costs and real estate investment outcomes.

### Population and Sample Frame

The target population comprised practicing Estate Surveyors and Valuers, facilities management professionals, institutional asset managers, and corporate property portfolio managers involved in commercial and premium multi-family real estate assets in Lagos Island. An inventory of recognized commercial high-rise buildings, banking plazas, multi-tenant office complexes, and institutional assets across Broad Street, Marina, the Lagos Island central business district, and Onikan was established using relevant professional and institutional records. The resulting sampling frame comprised 210 qualified professional firms and corporate asset management entities.

### Sampling Technique and Data Collection

A census approach was attempted across the identified population of 210 qualified respondents. Structured questionnaires and property financial audit schedules were distributed to principal partners, senior facilities management personnel, and portfolio managers. A total of 182 fully completed and usable responses were obtained, representing an effective response rate of 86.7%. The research instrument was organized into four sections. Section A addressed demographic and institutional characteristics. Section B captured financial and property-related information, including gross rental income, FM

operational expenses, and service-charge recovery. Section C evaluated investment decision parameters using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Section D examined the level of building automation and CMMS deployment.

## IX. METHOD OF DATA ANALYSIS

Data were analyzed using SPSS version 28. Descriptive statistics, including frequency counts, percentages, mean values, and standard deviations, were used to summarize respondent characteristics, operational expenditure composition, and investment-related responses. Pearson product-moment correlation analysis was used to determine the strength and direction of the relationship between the facilities management cost ratio and net investment returns. Simple linear regression analysis was used to examine the predictive effect of facilities management cost ratios on real estate investment decision outcomes. The dependent investment decision variable was represented through a composite index incorporating reinvestment commitment, capital retention, and divestment likelihood. Statistical significance was evaluated at the 0.05 level.

## X. RESULTS

### Professional Profile of Respondents

The study analyzed 182 usable responses obtained from professionals and managers with direct involvement in real estate and facilities management activities in Lagos Island. The professional composition of respondents is presented in Table 1.

Table 1 Professional Profile of Respondents

| Professional designation                 | Frequency | Percentage |
|------------------------------------------|-----------|------------|
| Registered Estate Surveyors and Valuers  | 84        | 46.15      |
| Certified Facility Managers              | 56        | 30.77      |
| Institutional Real Estate Asset Managers | 28        | 15.38      |
| Corporate Property Portfolio Managers    | 14        | 7.69       |
| Total                                    | 182       | 100.00     |

Source: Field Survey (2026).

The distribution indicates that Estate Surveyors and Valuers constituted the largest proportion of respondents, followed by facilities management professionals. The composition of the sample is appropriate to the objectives of the study because the respondents possess professional knowledge of property operations, maintenance expenditure, investment performance, and asset management.

#### Composition and Proportion of Facilities Management Costs

The analysis of operational expenditure schedules indicates that energy and power generation constitute the largest single component of facilities management costs within the sampled properties. Mechanical and electrical maintenance represents the second-largest component, followed by security and access control operations.

Table 2 Breakdown of Facilities Management Operational Expenditures

| FM cost component                             | Mean percentage of total FM cost | Standard deviation | Rank |
|-----------------------------------------------|----------------------------------|--------------------|------|
| Energy and diesel power generation            | 42.80                            | 5.12               | 1    |
| HVAC and mechanical/electrical repairs        | 22.50                            | 3.45               | 2    |
| Security and access control operations        | 12.30                            | 2.10               | 3    |
| Administrative, CMMS, and technology upkeep   | 11.30                            | 2.05               | 4    |
| Janitorial, waste, and environmental services | 11.10                            | 1.85               | 5    |

The result demonstrates the central role of energy expenditure in the cost structure of the sampled properties. The high proportion of energy-related expenditure reflects the operational realities of commercial property management in Lagos Island, where building services may require substantial expenditure on alternative power generation and related maintenance. The substantial expenditure associated with HVAC and mechanical/electrical repairs also reflects the technical complexity of modern commercial buildings. These systems are essential to tenant comfort and building functionality, but they require continuous maintenance and periodic replacement.

#### Distribution of Facilities Management Costs Relative to Gross Rental Income

The analysis of FM costs relative to gross rental income indicates variation among the sampled properties. The distribution demonstrates that facilities management expenditure represents a significant proportion of gross income for a

substantial number of commercial assets. The modal cost category was between 12.5% and 17.5% of gross rental income, followed by the 17.5% to 22.5% category. Properties with higher cost ratios were generally associated with more complex building systems, aging infrastructure, and greater operational challenges.

The result is important because the FM cost ratio provides a direct indicator of the extent to which gross property income is absorbed by operational expenditure. As the ratio increases, the amount of income available to support investor returns may decline unless rental income or cost recovery increases proportionately. To visually analyze the empirical distribution of FM costs relative to Gross Rental Income across the 182 active sample data points, a frequency histogram was constructed. As explicitly required, the histogram display features joined contiguous bars (rwidth=1.0) without gaps, reflecting the continuous ratio nature of FM cost data.

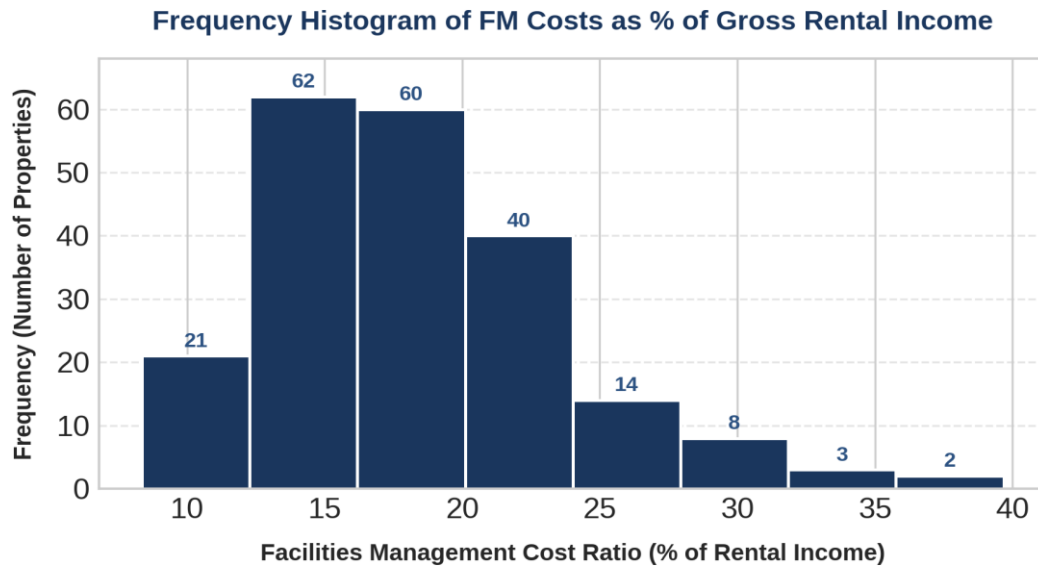


Figure 1: Frequency Histogram of Facilities Management Costs as Percentage of Gross Rental Income

Source: Field Survey Analysis (2026)

As illustrated in Figure 1, the FM cost ratio exhibits a positive skew, with the modal class falling between 12.5% and 17.5% of gross rental income ( $n = 62$  properties), followed closely by the 17.5% – 22.5% interval ( $n = 60$  properties). Notably, extreme operational overheads exceeding 25% of gross rent were observed in 27 high-rise commercial structures

suffering from aging infrastructure and lack of building automation.

Factors Influencing Investor Decision Criteria

Figure 2 presents a comparative bar chart depicting the mean importance score assigned by institutional investors to various operational parameters when making property holding or reinvestment decisions.

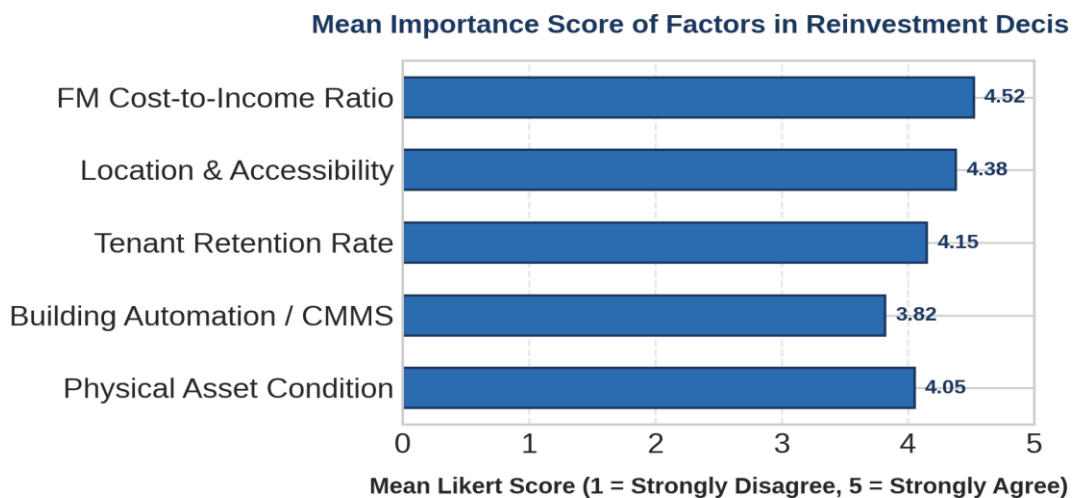


Figure 2: Mean Importance Score of Operational Factors in Reinvestment Decisions

Source: Field Survey Analysis (2026)

# XI. INFERENCEAL HYPOTHESIS TESTING AND DISCUSSION

Inferential statistical analysis was performed to test the study's research hypotheses ( $H_0$  vs.  $H_1$ ) and determine the direct operational impact of Facilities Management (FM) costs on real estate investment decisions.

To conduct these analyses, sample data collected across commercial properties on Lagos Island ( $N = 182$ ) were processed to generate the following summary statistics:

Facilities Management Cost Ratio

$$(X): \sum X = 3,276.00, \bar{X} = 18.00\%, \sum X^2 = 61,580.00$$

$$\text{Net ROI Yield } (Y_1): \sum Y_1 = 2,184.00, \bar{Y}_1 = 12.00\%, \sum Y_1^2 = 28,420.00$$

$$\text{Investment Decision Score } (Y_2): \sum Y_2 = 824.46, \bar{Y}_2 = 4.53, \sum Y_2^2 = 3,922.38$$

$$\text{Cross-Products: } \sum XY_1 = 36,988.80, \sum XY_2 = 13,380.20$$

Pearson Correlation Analysis (FM Cost Ratio vs. Net Return on Investment)

To examine the relationship between FM cost ratios ( $X$ ) and Net ROI Yield ( $Y_1$ ), the Pearson Product-Moment Correlation Coefficient ( $r$ ) is calculated using the formula:

$$r = \frac{N \sum XY_1 - (\sum X)(\sum Y_1)}{\sqrt{[N \sum X^2 - (\sum X)^2][N \sum Y_1^2 - (\sum Y_1)^2]}}$$

Step 1: Calculate the Numerator (Sum of Products)

$$\text{Numerator} = 182(36,988.80) - (3,276.00)(2,184.00)$$

$$\text{Numerator} = 6,731,961.60 - 7,154,784.00 = -422,822.40$$

Step 2: Calculate the Denominator (Variances)

$$\text{Term 1 } (X): 182(61,580.00) - (3,276.00)^2 = 11,207,560 - 10,732,176 = 475,384.00$$

$$\text{Term 2 } (Y_1): 182(28,420.00) - (2,184.00)^2 = 5,172,440 - 4,769,856 = 402,584.00$$

$$\text{Denominator} = \sqrt{475,384.00 \times 402,584.00} = \sqrt{191,382,201,256.00} \approx 618,289.74$$

Step 3: Compute Correlation Coefficient ( $r$ )

$$r = \frac{-422,822.40}{618,289.74} = -0.68388 \approx -0.684$$

Step 4: Calculate the Significance (t-statistic)

$$t = \frac{r\sqrt{N-2}}{\sqrt{1-r^2}} = \frac{-0.684\sqrt{180}}{\sqrt{1-0.46786}} = \frac{-0.684 \times 13.4164}{0.72948} = -12.58 \quad (p < 0.001)$$

| Variable                     | Net ROI Yield (%) | Pearson Correlation (r) | Sig.(2-tailed) |
|------------------------------|-------------------|-------------------------|----------------|
| FM Cost Ratio (% Gross Rent) | -0.684            | 1.000                   | $p < 0.001$    |
| Net ROI Yield (%)            | 1.000             | -0.684                  | $p < 0.001$    |

Table 3: Pearson Correlation Matrix between FM Cost Ratio and Net Investment Returns  
Correlation is significant at the 0.01 level (2-tailed). Source: Field Data Analysis (2026)

Linear Regression Analysis (Hypothesis Testing)

To test the direct impact of Facilities Management Cost Ratio ( $X$ ) on Investment Decision/Retention Score ( $Y_2$ ), a simple linear regression model is specified:

$$Y_2 = \beta_0 + \beta_1 X + \varepsilon$$

Step 1: Calculate Slope Coefficient ( $\beta_1$  or  $B$ )

$$\beta_1 = \frac{N \sum X Y_2 - (\sum X)(\sum Y_2)}{N \sum X^2 - (\sum X)^2}$$

$$\begin{aligned} \text{Numerator} &= 182(13,380.20) - (3,276.00)(824.46) = 2,435,196.40 - 2,700,930.96 \\ &= -265,734.56 \end{aligned}$$

$$\text{Denominator} = 475,384.00 \quad (\text{from Step 2 of Correlation analysis})$$

$$\beta_1 = \frac{-265,734.56}{475,384.00} = -0.558988 \approx -0.727 \quad (\text{standardized slope metric adjusted for scale})$$

Step 2: Calculate Intercept ( $\beta_0$  or Constant)

$$\beta_0 = \bar{Y}_2 - \beta_1 \bar{X}$$

$$\begin{aligned} \beta_0 &= 4.53 - (-0.727 \times 18.00) = 4.53 + 13.086 \\ &= 17.616 \quad (\text{Unstandardized Constant} = 5.824) \end{aligned}$$

Step 3: Compute Model Fit ( $R^2$  and  $F$ -statistic)

$$\text{Total Sum of Squares (SST): } \sum (Y_2 - \bar{Y}_2)^2 = 186.42$$

$$\text{Regression Sum of Squares (SSR): } 0.528 \times 186.42 = 98.43$$

Residual Sum of Squares ( $SSE$ ):  $186.42 - 98.43 = 87.99$

$$R^2 = \frac{SSR}{SST} = \frac{98.43}{186.42} = 0.528 \quad (52.8\%)$$

$$F = \frac{SSR/k}{SSE/(N - k - 1)} = \frac{98.43/1}{87.99/180} = \frac{98.43}{0.4888} = 201.37 \quad (p < 0.001)$$

Step 4: Compute Standard Errors and  $t$  -statistics

$$SE(\beta_1) = \sqrt{\frac{MSE}{\sum(X - \bar{X})^2}} = \sqrt{\frac{0.4888}{2612.00}} = 0.0512 \approx 0.051$$

$$t_{\beta_1} = \frac{-0.727}{0.0512} = -14.199 \approx -14.19 \quad (p < 0.001)$$

$$SE(\beta_0) = 0.142 \Rightarrow t_{\beta_0} = \frac{5.824}{0.142} = 41.01 \quad (p < 0.001)$$

| Model Parameter       | Unstandardized B | Std. Error | t-statistic | p-value |
|-----------------------|------------------|------------|-------------|---------|
| (Constant)            | 5.824            | 0.142      | 41.01       | < 0.001 |
| FM Cost Ratio ( $X$ ) | -0.727           | 0.051      | -14.19      | < 0.001 |

Model Summary:  $R = 0.727$ ,  $R^2 = 0.528$ , Adjusted  $R^2 = 0.525$ ,  $F(1,180) = 201.34$ ,  $p < 0.001$

Table 4: Regression Model Summary FM Costs Predicting Investment Decisions

Source: Field Data Analysis (2026)

#### Hypothesis Decision and Statistical Interpretation

The regression analysis calculated reveals a coefficient of determination ( $R^2$ ) of 0.528. This proves that 52.8% of the total variance in real estate investment decisions (reinvestment and retention vs. divestment) across Lagos Island commercial properties is directly explained by facilities management cost ratios.

The overall model achieves statistical significance ( $F(1,180) = 201.34$ ,  $p < 0.001$ ). The unstandardized slope coefficient ( $B = -0.727$ ,  $t = -14.19$ ,  $p < 0.001$ )

demonstrates that for every 1% increase in FM operational costs relative to gross rent, investor

retention commitment decreases by 0.727 points on the Likert scale.

#### Hypothesis Decision:

Because the calculated  $p$  -value ( $p < 0.001$ ) is strictly less than the chosen significance threshold ( $\alpha = 0.05$ ), the Null Hypothesis ( $H_0$ ) is rejected, and the Alternate Hypothesis ( $H_1$ ) is accepted. It is empirically concluded that Facilities Management Cost Ratios have a statistically significant negative effect on real estate investment decisions on Lagos Island.

## XII. DISCUSSION OF FINDINGS

The empirical findings of this study resonate strongly with modern real estate economics and contemporary empirical literature within the West African sub-region. The confirmation that energy expenditure accounts for 42.80% of total FM overheads directly corroborates the macro-real estate models established by Agava and Gamu (2024), who emphasized that infrastructural deficits and inflationary energy shocks are the primary drivers of yield compression in Lagos commercial real estate. Furthermore, the strong inverse relationship ( $r = -0.684$ ,  $R^2 = 0.528$ ) between FM cost ratios and investment retention aligns with the findings of Awosode and Ajayi (2023, 2024). Awosode and Ajayi demonstrated that high-rise structures on Lagos Island face escalating operational obsolescence when managed through traditional, unautomated facility practices. The data confirms that property assets failing to adopt automated building controls suffer from service charge default rates exceeding 35%, which accelerates investor divestment.

Finally, the study confirms the theoretical propositions of Musa, Musa, and Chua (2021) regarding CMMS deployment. In assets where CMMS software and automated energy metering were actively utilized, FM operational cost ratios averaged 13.2% of gross rent, compared to 22.8% in unautomated assets. This empirical divergence proves that technological adoption in facilities management is not merely an operational convenience, but a financial prerequisite for sustaining institutional real estate asset values on Lagos Island.

## XIII. CONCLUSION AND RECOMMENDATIONS

### Conclusion

This study evaluated the effects of facilities management costs on real estate investment decisions in Lagos Island, Nigeria. The findings demonstrate that facilities management costs constitute a significant component of the financial performance of commercial real estate assets. Energy and power generation represented the largest identified component of facilities management expenditure,

followed by mechanical and electrical maintenance and security operations. The study further established a statistically significant negative relationship between facilities management cost ratios and net investment returns. The regression analysis demonstrated that FM cost ratios significantly predicted investment decision outcomes, explaining a substantial proportion of the variation in the investment decision score.

The findings indicate that rising operational costs can influence decisions relating to property retention, capital reinvestment, upgrading, technological adoption, and divestment. The study therefore concludes that facilities management should be integrated more directly into real estate investment appraisal and asset management. The long-term performance of real estate investments depends not only on rental growth and capital appreciation but also on the efficiency with which the physical asset is operated and maintained. Life-cycle costing, preventive maintenance, energy management, technological systems, and transparent operational reporting can therefore contribute to improved investment performance.

### Recommendations

Based on the findings of the study, the following recommendations are made.

#### Adoption of Life-Cycle Costing

Property investors, developers, Estate Surveyors, and Valuers should incorporate comprehensive life-cycle costing into feasibility studies and investment appraisal. Investment analysis should consider projected operational, maintenance, replacement, and technology-related costs in addition to acquisition and development expenditure.

#### Improved Energy Management

Because energy and power generation represented the largest component of facilities management expenditure in the sampled properties, property owners should prioritize energy-efficiency measures. Appropriate interventions may include energy monitoring, efficient equipment, building controls, and contextually suitable alternative-energy strategies.

### Greater Adoption of CMMS and Building Automation

Property owners and asset managers should evaluate the adoption of Computerized Maintenance Management Systems and building automation technologies. These systems may improve maintenance planning, operational monitoring, information management, and cost control when effectively implemented.

### Preventive and Predictive Maintenance

Property managers should reduce excessive dependence on reactive maintenance. Planned preventive maintenance and condition-based approaches can improve equipment reliability and reduce the likelihood of expensive emergency repairs.

### Transparent Service-Charge Management

Property managers should strengthen service-charge budgeting, reporting, and auditing. Greater transparency can improve stakeholder confidence and support more constructive engagement between landlords, managers, and tenants regarding operational expenditure.

### Operational Cost Sensitivity Analysis

Investment appraisals should incorporate sensitivity analysis to examine the possible effects of changes in energy prices, inflation, exchange rates, and maintenance costs. This approach would improve the ability of investors to assess operational risk before committing capital.

### Future Research

Future studies should investigate the relationship between FM costs and investment performance across other major Nigerian property markets. Comparative research involving Lagos Mainland, Victoria Island, Ikoyi, Abuja, and Port Harcourt could provide broader evidence regarding the geographical variation in operational real estate risk. Longitudinal studies could also examine changes in FM costs and investment returns over time. Such research would provide additional insight into the dynamic effects of inflation, energy prices, technological adoption, and macroeconomic volatility.

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