Top Academic Journal of Environmental and Agricultural Sciences
Vol. 10, Issue 5; July-September 2025;
ISSN:2994 -0583
Impact Factor: 8.47
1252 Columbia Rd NW, Washington DC, United States
https://topjournals.org/index.php/TAJEAS; mail: topacademicjournals@gmail.com

EFFECT OF SMART BUILDING TECHNOLOGIES AND REAL ESTATE MANAGEMENT IN ENUGU STATE

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DOI: https://doi.org/10.5281/zenodo.17122297

Abstract
The study is to examine on the effect of Smart Building Technologies on Real Estate Management in Enugu State. The specific objectives of the study were to; examine the effect of Building Management Systems (BMS) on Real Estate Management in Enugu State. And evaluate the effect of Energy Management Systems on Real Estate Management in Enugu State. A descriptive survey design was adopted for the study. Data collection involved appropriate tools, especially questionnaires designed with a five-point Likert scale. The collected data were coded and imported into SPSS for analysis. Descriptive statistics were then applied to analyze and describe the data, while hypothesis testing was performed using Multiple Regression analysis. The result revealed that Building Management Systems has a significant positive effect on Real Estate Management with a p-value of (0.003<0.05). Energy Management Systems has a significant positive effect on Real Estate Management with a p-value of (0.003<0.05) in Enugu State. Therefore, the study concluded that Smart Building Technologies has a significant positive effect on Real Estate Management in Enugu State. The study recommended that Real estate developers and property managers should prioritize the integration of Building Management Systems in their projects. Training programs should be established to educate stakeholders about the benefits and functionalities of BMS, emphasizing how these systems can enhance operational efficiency and tenant satisfaction.
Keywords: Building, Management, Real-Estate, Smart, Technologies

1.1 Introduction

Smart building technology is revolutionizing modern infrastructure by integrating automated processes, Internet of Things (IoT) devices, data analytics, and Artificial Intelligence (AI) systems within a building's infrastructure (TechCrunch. 2022). These technologies enhance operational performance, energy efficiency, security, and occupant experience. Smart buildings are designed to be intelligent structures that utilize various technologies to build integrated systems that enhance functionality, efficiency, and sustainability (Schwartz, 2020; Smith, 2022). They represent a significant shift from traditional building management practices to a more integrated and intelligent approach. It's estimated that in 2022, there were 45 million smart buildings worldwide, a number that is expected to increase to 115 million in 2026, demonstrating a rapid growth in adoption (Rouse, 2018; Deloitte. 2023). A smart building is a property or structure that uses intelligent technologies to automate and optimize its

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essential functions. It distinguishes itself from conventional buildings through its ability to facilitate a more comfortable environment for occupants with minimal human intervention (McKinsey & Company, 2024). This involves a network of intelligent systems and automated processes working together to improve the ease-of-use of a building. Smart buildings gather data constantly to enhance performance and improve efficiency through various installed devices.

Smart building technology is revolutionizing the real estate management landscape, offering innovative solutions that enhance operational efficiency, sustainability, tenant satisfaction, and property value (Akinmoladun et al., 2021). By integrating advanced systems such as the Internet of Things (IoT), cloud-based property management solutions, and artificial intelligence (AI), smart buildings are transforming how properties are managed and operated (Ekanem et al., 2022). These technologies enable real-time data collection and analysis, automation of processes, and proactive management of building systems, leading to significant improvements in energy consumption, cost savings, and overall building performance. As the demand for sustainable and efficient spaces grows, smart building technology is becoming essential for staying competitive in the real estate market.

Smart building technology involves the integration of advanced systems into real estate properties to automate processes, monitor building performance, and enhance the experience for tenants and property managers. Unlike traditional buildings that rely on manual processes, smart buildings leverage real-time systems and automation to optimize building operations (Jones, 2021).

Enugu State, located in southeastern Nigeria, is experiencing rapid urbanization and economic growth, making it an attractive destination for real estate investment. However, the real estate sector in Enugu faces challenges such as inadequate infrastructure, security concerns, and the need for sustainable development (Iwuagwu & Iwuagwu, 2014). Smart building technologies offer innovative solutions to these challenges, promising to revolutionize real estate management by enhancing operational efficiency, increasing property value, improving tenant satisfaction, and promoting sustainability. As the demand for modern, efficient, and secure properties grows, the adoption of smart building technologies is becoming increasingly important for real estate stakeholders in Enugu State.

1.2 Statement of the Problem

The real estate sector in Enugu State, Nigeria, is facing significant challenges, including inefficient property management practices, rising operational costs, security concerns, and a lack of sustainable development solutions. Traditional approaches to real estate management often rely on manual processes that hinder operational efficiency and tenant satisfaction. As urbanization accelerates and demand for modern living spaces increases, there is a pressing need for innovative solutions that can enhance property management and improve building performance.

Despite the potential benefits of smart building technologies such as automated systems for energy management, enhanced security features, and improved tenant engagement—adoption in Enugu State remains limited. Factors such as high initial costs, inadequate infrastructure, a lack of technical expertise, and resistance to change impede the integration of these technologies into existing real estate practices. This study aims to investigate the effects

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of smart building technologies on real estate management in Enugu State, focusing on identifying barriers to adoption, understanding the potential benefits, and exploring how these technologies can address the unique challenges faced by the local real estate market. By examining the impact of smart building technologies, this research seeks to provide valuable insights that can guide stakeholders in making informed decisions to modernize real estate management practices and contribute to sustainable urban development in Enugu State.

1.3 Objective of the Study

The main objective of this study is to examine on the effect of Smart Building Technologies on Real Estate Management in Enugu State. The specific objectives of the study were to;

i. Examine the effect of Building Management Systems (BMS) on Real Estate Management in Enugu State.

ii. Evaluate the effect of Energy Management Systems on Real Estate Management in Enugu State.

1.4 **Hypotheses of the Study**

i. Building Management Systems (BMS) has no significant effect on Real Estate Management in Enugu State.

ii. Energy Management Systems has no significant effect on Real Estate Management in Enugu State.

Review of Related Literature

2.1 Conceptual Review

Smart Building Technologies

According to Sherif, Sherif, and Eissa (2018), smart buildings are defined as "automated buildings, intelligent buildings, and buildings with smart technology." This term refers to structures equipped with various technologies, including digital infrastructure, energy-efficient solutions, intelligent building management systems, wireless technologies, remote monitoring, information and communication networks, adaptive energy systems, networked appliances, data collection devices, assistive technologies, and automated systems. Additionally, Smart building technology combines building automation systems, integration systems, and telecommunication systems to enhance a smart building's efficiency, functionality, optimization, comfort, and economic viability (Indrawati and Amani, 2017). A smart building is designed to optimize its structures, systems, services, and management while considering their interconnections to create a productive and cost-effective environment. In their research, Buckman, Mayfield, and Beck (2014) categorized Smart building technology into four key areas: intelligent, enterprise, control, and materials and construction, emphasizing that these should be adaptable to advancements in energy efficiency, comfort, satisfaction, and longevity (life cycle).

The global construction industry has a significant influence on the environment, economy, and social development. It is essential to consider economic, environmental, and social factors in relation to smart building technologies as part of the future of our built environment (Alaloul et al., 2021). Smart buildings can be viewed as intelligent and self-sustaining structures that utilize sensors, advanced technologies, and innovative materials to enhance energy management and occupant comfort. Recently, the spotlight has turned to the advantages of implementing smart buildings in both developed and developing countries. The products of the built environment are designed to optimize energy efficiency, promote raw material recycling, and contribute to a sustainable, carbon-free environment, showcasing the application of technology within the construction industry (Casini, 2016). Achieving smart buildings necessitates the promotion of efficient technologies and the integration of smart building practices within the built environment. However, developing countries face numerous barriers and challenges in adopting smart building technology (SBT) to attain sustainable construction (Ejidike & Mewomo, 2022).

Building Management Systems (BMS)

Building Management Systems (BMS) are computer-based control systems installed in buildings to manage and monitor the mechanical and electrical equipment through various systems. Also known as Building Automation Systems, these systems provide automatic monitoring and control for functions such as lighting, pumping, heating, cooling, and ventilation, thereby enhancing energy performance and occupant welfare (Yusefi et al., 2019). The primary goal of a BMS is to improve the condition, supervision, and control of the building. BMS offers effective solutions for smart building management strategies, enabling residents to achieve greater efficiency. Research from the Atlanta Association and the ASHRAE project indicates that investing in BMS can lead to savings of over 14% in annual productivity costs and is beneficial for heating and improving environmental engineering. Additionally, BMS reduces energy consumption while enhancing internal comfort. By integrating multiple subsystems into a single framework, BMS ensures optimal performance, energy efficiency, and occupant comfort (Kamali et al., 2014).

A Building Management System (BMS) not only manages all devices within the building but also provides comprehensive protection against burglary, fire, and gas leaks through its security and safety systems. The effectiveness of a BMS is closely tied to the energy consumption of the building and the comfort of its occupants. The importance of BMS is well recognized, as these systems facilitate continuous energy management, leading to potential energy and cost savings (Puķīte & Geipele, 2017). They are highly flexible and can be easily adapted to meet various needs. Additionally, improvements and changes can be made during operations to enhance performance and reduce energy and maintenance costs. In smart buildings, many tasks that were traditionally performed manually are now handled by intelligent systems (Kamali et al., 2014). The role of BMS as an integrator is particularly emphasized, as it links HVAC, lighting, security, energy metering, and other subsystems to optimize building performance holistically rather than in isolation. Practical studies and industry guides highlight that open protocols, modular architectures, and scalable networks are crucial for achieving this integration. However, challenges such as legacy wiring, costs, and the absence of open protocols continue to hinder adoption in retrofit scenarios (Taboada-Orozco et al., 2024; Atrius, 2024).

Energy Management Systems

Energy Management Systems (EMS) are frameworks, whether technical, organizational, or hybrid, that monitor, coordinate, and optimize the generation, storage, distribution, and consumption of energy to achieve economic, technical, and sustainability goals. The International Organization for Standardization defines a closely related concept, the Energy Management System (EnMS), as a structured management framework that systematically and continuously improves energy performance (Li et al., 2015). An EMS functions as a computer and automation system that manages generation and transmission assets while ensuring supply security at minimal cost. It is not merely a solution but a strategic response to global energy challenges, playing a crucial role in promoting efficient resource utilization, reducing waste, and contributing to the development of future energy systems (Zhang, 2023). According to Olatomiwa et al. (2016), the EMS focuses on monitoring, analyzing, and optimizing energy usage, making it an essential tool for sustainability today. Its primary aim is to provide detailed insights into energy consumption through real-time data monitoring and intelligent analysis, facilitating the creation of effective energy management strategies. As energy demand grows and climate change poses increasing threats, the significance of EMS continues to rise (Olatomiwa et al., 2016).

These systems provide consumers with a framework to understand, manage, and improve their energy usage. By analyzing data, they help users identify peak energy consumption times and areas where waste occurs. Through targeted energy optimization strategies, these systems can effectively reduce energy consumption and minimize unnecessary waste. This not only lowers energy costs and mitigates resource depletion but also fosters a more efficient and sustainable energy environment. Users can decrease their carbon footprint, fulfill corporate social responsibility obligations, and contribute to global greenhouse gas reduction targets by making appropriate adjustments to equipment operations, predicting energy consumption, and implementing optimization measures (Zhang, 2023). According to Zia et al. (2018), the benefits of energy conservation extend beyond resource preservation; they also provide financial advantages for businesses and organizations. By reducing energy costs and enhancing production efficiency, EMS supports sustainable economic growth. Furthermore, optimized energy use allows businesses to improve their competitiveness and achieve sustainable market development. The field of EMS is continuously evolving and innovating. With advancements in technology and shifting market demands, its development is becoming increasingly efficient. Governments are placing greater emphasis on energy management, promoting sustainability and environmental regulations within society. In the dynamic energy landscape, EMS has emerged as a crucial tool for achieving energy efficiency, controlling costs, and ensuring environmental sustainability, thereby offering essential support for future sustainable development (Li et al., 2016; Zia et al., 2018).

Real Estate Management

Real estate management (REM) constitutes a multidisciplinary domain that encompasses the supervision, administration, preservation, valuation, and systematic optimization of property assets across residential, commercial, and public sectors. It integrates operational functions such as routine property maintenance, tenant relations, and infrastructural upkeep with strategic objectives, including value enhancement, portfolio performance, and risk mitigation. According to professional institutions and scholars, REM is increasingly conceptualized as both a technical and managerial discipline that unites facilities and asset maintenance, financial administration, regulatory and legal compliance, and long-term asset planning (RICS, 2016). Furthermore, REM

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may be understood as a strategic and investment-oriented undertaking aimed at maximizing the economic returns of properties and portfolios throughout their life cycle by means of capital investment, repositioning, financing, and proactive portfolio administration. This differentiation is significant, as it delineates operational management functions (typically carried out by property or facility managers) from higher-level portfolio and investment responsibilities (associated with asset managers) (Wiśniewski & Wiśniewski, 2024).

Muczyński (2015) observes that the practice of real estate management has evolved in line with the expansion of the real estate sector, the demands of property investors, and the broader transformations within the market environment. In contemporary contexts, these activities necessitate both a holistic perspective and, simultaneously, an increasing degree of specialization. He further conceptualizes real estate management by drawing on statutory definitions that aimed to organize and standardize such activities. In its original formulation, the definition stated that real estate management encompasses all decisions and actions required to preserve a property in appropriate condition consistent with its intended use, alongside undertaking justified investments in real estate (Muczyński, 2015). The contemporary interpretation, however, advances a broader, more proactive, and strategic orientation that surpasses short-term operational tasks. This modern view emphasizes managing individual properties or entire portfolios over their full life cycle while responding to the complexity and dynamism of the market environment. Central to this approach is the enhancement of asset value, whereby both income generation and the capital appreciation of property can be maximized through effective real estate management (Abdullah et al., 2015).

2.2 Theoretical reviews

Systems theory

Systems theory, introduced by Ludwig von Bertalanffy in 1968, offers a valuable conceptual framework for analyzing Building Management Systems (BMS) as integrated and interdependent entities rather than as separate technological components. The theory highlights key principles such as interdependence, feedback, system boundaries, and hierarchical organization, drawing attention to how subsystems, including HVAC, lighting, security, and energy metering, interact to generate emergent patterns of building performance (Mele, Pels, & Polese, 2010). When applied to BMS, this theoretical lens shifts the focus from the functionality of individual devices to broader systemic characteristics, including adaptability, resilience, and homeostatic balance, which are essential for ensuring efficient, sustainable, and occupant-oriented building operations.

Recent studies in smart-building literature highlight this integration: modern BMS increasingly combine Internet of Things (IoT) devices, machine learning controllers, and digital twins, extending the system boundary to networks and users, and creating multi-level feedback and time-dependent dynamics (Taboada-Orozco et al., 2024; Agostinelli et al., 2021). Model predictive control, distributed optimization, and hierarchical control frameworks represent applications of systems principles, employing models of subsystem interactions and predictive feedback to preserve overall stability and energy efficiency (Agostinelli et al., 2021).

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Socio-Technical Systems Theory

Socio-Technical Systems (STS) Theory, first introduced by Emery and Trist in 1960, offers a useful framework for examining the development and implementation of Energy Management Systems (EMS). The theory maintains that organizations are made up of interdependent social and technical subsystems that need to be jointly optimized for effective outcomes. This perspective highlights that technical advances cannot reach their full potential unless aligned with human, organizational, and cultural factors. Applied to EMS, STS views them as part of socio-technical networks where adoption and effectiveness rely on both technological capability and human-system compatibility (Fox, 2019). For instance, smart metering projects have had limited results when users lacked trust in the technology or were unable to interpret energy data properly (Zhang, 2023). Taboada-Orozco et al. (2024) highlight that user acceptance and behavioural involvement are crucial in smart energy systems, indicating that participatory design approaches and clear communication of energy data enhance system legitimacy and uptake. This aligns with recent STS perspectives that stress co-creation among designers, users, and institutions as a route to sustainable technology implementation (Ghosh et al., 2022).

2.3 Empirical Reviews

Kamali, Khakzar, & Abdali-Hajiabadi (2014) conducted a study on the effect of Building Management System (BMS) on energy saving in selected buildings in San Francisco, USA. The study aims to introduce and explain the role of building energy management systems in reducing building energy use and to introduce and explain the role of building energy management systems in reducing building energy use. The study adopted a case study method of research. The results revealed that implementing the BMS in the studied office building produced a 50% reduction in energy consumption for the building examined.

Julaihi et al (2017) conducted a study to investigate the performance of the implementation of an energy management system in an office building in Kuching, Sarawak, Malaysia. The study aims to assess the performance of implementing an EnMS in an office building, in terms of electricity consumption (kWh) and cost, to quantify energy savings (in electricity and cost) achievable by applying energy management practices, examine life-cycle cost implications of energy saving options, and compare alternatives and to identify organizational or behavioral factors (such as staff awareness, policy, housekeeping practices) that meaningfully contribute to EnMS success. The study adopted an exploratory approach by using a tool developed by UNIDO called EnMS, or Energy Management System. The results revealed that implementing energy management can reduce electricity consumption up to 30%, and serious initiatives by the organization are needed to promote the effectiveness of energy management.

Kalyanam (2021) conducted a study to find out how Building Management System (BMS) will integrate with the IoT for enhancing operational efficiency, energy management, and sustainability in the Regional Municipality of Niagara in Ontario, Canada. The study aims to analyze how the integration of IoT devices with BIM technologies could improve the interoperability of systems and enhance decision-making capabilities. The study adopted a

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systematic literature review. The results revealed that BMS contributes not only to operational savings but also to broader sustainable development goals and improved occupant comfort.

Zhang (2023) conducted a study to delve into the core concepts, technological applications, and future trends of the Energy management system (EMS) in China. The study aims to comprehensively analyze the practical applications of the EMS in various fields from various perspectives, including system architecture and data analysis methods, and provide an in-depth understanding of their positive impact on energy efficiency, environmental sustainability, and economic development. The study adopted a qualitative/analytical approach. The results revealed that EMS are essential for sustainability as they help in integrating renewable energy sources (RES) with traditional grid systems, managing volatility, and enabling a more stable, efficient, and sustainable power supply.

3. Methodology

Study Area

Study Area

This study is situated in **Enugu State**, located in the southeastern region of Nigeria. Enugu State serves as a major administrative, commercial, and industrial hub within the region. It shares boundaries with Abia and Imo States to the south, Ebonyi State to the east, Benue State to the northeast, Kogi State to the northwest, and Anambra State to the west. The state covers a land area of approximately 7,161 square kilometers and has an estimated population of over 4 million people, according to the National Population Commission projections. Enugu city, the state capital, is a rapidly growing urban center known for its educational institutions, government establishments, real estate developments, and increasing private sector investments.

Enugu State has witnessed significant growth in its real estate sector over the last two decades, driven by urbanization, population growth, infrastructural development, and an expanding middle class. The demand for residential, commercial, and mixed-use properties has led to the emergence of modern buildings, estates, and high-rise developments. This growth has increased interest in adopting **Smart Building Technologies (SBTs)** such as automated security systems, energy management systems, intelligent lighting, HVAC control, building management systems, and IoT-enabled monitoring tools—to improve operational efficiency, sustainability, and user experience in property management.

Given the state's status as an evolving urban center with expanding real estate infrastructure, Enugu presents an ideal context for examining the **effect of Smart Building Technologies on real estate management**. The study area provides a unique opportunity to analyze how technology adoption can transform traditional property management practices, enhance energy efficiency, reduce operational costs, and improve tenant satisfaction. Furthermore, Enugu's mix of old and new building stock allows for a comparative analysis of properties with and without smart technologies, making it a suitable case for understanding their impact on real estate management outcomes.

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Method

The primary aim of a research design is to establish a framework for the collection, analysis, and interpretation of data. In this study, a descriptive survey design will be utilized to detail the data and characteristics of the target population. This approach seeks to collect factual, precise, and well-organized information while offering insights into the subjects under investigation. It is particularly advantageous given the large population from which the data is sourced. The research was conducted in selected private sectors in Enugu state Nigeria, known for their integrity. This study employed the survey research design to examine the effect of Smart Building Technologies on Real Estate Management in Enugu State. Nigeria. Data collection involved appropriate tools, especially questionnaires designed with a five-point Likert scale. The survey was crucial for gathering primary data needed to analyze the relationships between variables. The collected data were coded and imported into SPSS for analysis. To ensure accurate recording of relevant aspects, the data underwent modification and coding. Descriptive statistics were then applied to analyze and describe the data, while hypothesis testing was performed using Multiple Regression analysis. If the regression statistical measures fell below the $\alpha = 0.05$ significance level, they were considered acceptable and significant.

4. Data Presentation and Analysis

4.1 Data Presentation

The study encompassed a population of 236 individuals. Around 180 questionnaires were filled out and returned, resulting in a return rate of 76.3%, which is deemed acceptable. Descriptive and correlation analyses were employed to evaluate the data. A pilot test on 36 questionnaires yielded a Cronbach's alpha of 0.775, demonstrating a satisfactory level of reliability. The results are presented in the tables below.

4.2 Results

4.2.1 Gender of Respondents

The study population included a greater number of females than males, as shown in the pie chart below.

Table 2: Gender Distribution of Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	107	59.4	59.4	59.4
	Female	73	40.6	40.6	100.0
	Total	180	100.0	100.0	

Table 3: Age Distribution of Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Under 21 years	8	4.4	4.4	4.4
	21-30 years	109	60.6	60.6	65.0

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	31-40 years	49	27.2	27.2	92.2
	Above 40 years	14	7.8	7.8	100.0
	Total	180	100.0	100.0	

Table 4: Distribution of Respondents' Location

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Urban	117	65.0	65.4	65.4
	Local	62	34.4	34.6	100.0
	Total	179	99.4	100.0	
Missing	System	1	.6		
Total		180	100.0		

Table 5: Distribution of Respondents' Educational Level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below High School	6	3.3	3.3	3.3
	High School Graduate	31	17.2	17.2	20.6
	University Degree	131	72.8	72.8	93.3
	Master's or Higher	12	6.7	6.7	100.0
	Total	180	100.0	100.0	

Table 2-5 presents demographic details about the respondents, including their gender, age, location, and educational background. The data indicates that most respondents are male, comprising about 107 individuals (59%). The largest age group falls between 21 and 30 years, with around 109 respondents (61%). In terms of geographical distribution, a majority of participants are from urban areas, accounting for 117 individuals (65%) of the total sample. Lastly, concerning educational qualifications, a considerable number of respondents, 131 individuals (72.8%), hold a university degree.

4.3 Multiple Regression Analysis

Table 4.3: Multiple Regression Table

Model 1	Beta	Std. Error	t-Statistic	P-value
Building Management Systems (BMS)	0.71145	0.41319	1.72184	0.031
Energy Management Systems (EMS)	0.22714	0.03241	7.00833	0.000

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Constant	2.90181	0.11028	26.3131	0.000
Adj R^2	0.698			

Source: SPSS version 28.0

Table 4.3 above displays the results of the multiple regression analysis for both hypotheses one and two. Conducted at a 5% significance level, this analysis indicates that all predictor variables significantly influence the outcome variables. Further details can be found in the following hypothesis.

4.3 Hypotheses of the study

4.3.1 Hypothesis One

i. H_{01}: Building Management Systems (BMS) has no significant effect on Real Estate Management in Enugu State.

Regression Model of Hypothesis 1

Below is the equation for a model for Hypothesis 1

$$\mathbf{REM = \beta_0 + \beta_1 BMS + \varepsilon_i} \quad (1)$$

REM= Real Estate Management

BMS = Building Management Systems

Table 4.4.1: Regression Coefficient for model 1

Model 1	Beta	Std. Error	t-Statistic	P-value
Building Management Systems (BMS)	0.71199	0.41319	1.72315	0.037
Constant	2.90181	0.11028	26.3131	0.000
Adj R^2	0.698			

Source: SPSS version 28.0

Table 4.4.1 shows the values of adjusted R Square, unstandardized beta coefficient, standard error, t value, and P value. The value of adjusted R square is 0.698 meaning thereby 69.8% variation on Real Estate Management (REM), is explained by Building Management Systems (BMS) and the rest of the variation is unexplained on Real Estate Management due to variables that has not been considered in this model.

Besides, the value of the unstandardized beta coefficient is 0.71199 which means that if Building Management Systems (BMS) increases by one unit, then Real Estate Management (REM) will increase by 0.71199 units. This effect is statistically significant as the p-value is =0.037 which is less than 0.05 at 95% confidence interval. Therefore, the null hypothesis is rejected, and it can be said that there is a significant effect of Building Management Systems (BMS) on Real Estate Management (REM) in Nigeria.

4.4.2 Hypothesis Two

ii. H_{01}: Energy Management Systems has no significant effect on Real Estate Management in Enugu State.

Regression Model of Hypothesis 2

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Below is the equation for a model for Hypotheses 2

$$\mathbf{REM} = \boldsymbol{\beta}_0 + \boldsymbol{\beta}_1 \mathbf{EMS} + \boldsymbol{\varepsilon}_i \qquad (2)$$

REM= Real Estate Management

EMS = Energy Management Systems

Table 4.4.2: Regression Coefficient for Model 2

Model 1	Beta	Std. Error	t-Statistic	P-value
Energy Management Systems (EMS)	0.22714	0.03241	7.00833	0.000
Constant	2.90181	0.11028	26.3131	0.000
Adj R^2	0.698			

Source: SPSS version 28.0

Table 4.4.2 shows the values of adjusted R Square, unstandardized beta coefficient, standard error, t value, and P value. The value of adjusted R square is 0.698 meaning thereby 69.8% variation in the Real Estate Management (REM) is explained by Energy Management Systems (EMS) and the rest of the variation is unexplained on Real Estate Management due to variables that has not been considered in this model.

Besides, the value of the unstandardized beta coefficient is 0.22714 which means that Energy Management Systems (EMS) increases by one unit, then Real Estate Management (REM) will increase by 0.22714 units. This effect is statistically significant as the p-value is <0.000 which is less than 0.05 at a 95% confidence interval. Therefore, the null hypothesis is rejected, and it can be said that there is a significant effect of Energy Management Systems (EMS) on Real Estate Management (REM) in Nigeria.

4.4 Discussion of Findings

The study examined the effect of Smart Building Technologies on Real Estate Management in Enugu State. The Cronbach's alpha for these selected items was 0.775 as shown in Table 4.1, this result indicates that the items were reliable for measuring the variables we have selected.

The multiple linear regression results in Table 4.4.1 and 4.4.2 suggest that for hypothesis one, at a 5% level of significance, the Building Management Systems has a statistically significant effect on Real Estate Management in Enugu State Nigeria. while for hypothesis two, at a 5% level of significant the Energy Management Systems has a statistically significant effect on Real Estate Management in Enugu State. This result is based on their respective p-values which are below the threshold of < 0.05.

5. Conclusion

The integration of Smart Building Technologies in Enugu State has proven to have a significant positive impact on real estate management. The findings indicate that Building Management Systems (BMS) play a crucial role in enhancing operational efficiency, streamlining maintenance processes, and improving occupant comfort. By automating various building functions, BMS contribute to more effective management practices, ultimately leading to increased tenant satisfaction and property value.

Similarly, Energy Management Systems (EMS) have demonstrated a substantial positive effect on real estate management in the region. By optimizing energy consumption and promoting sustainability, EMS not only reduce operational costs but also align with global trends toward environmentally friendly practices. This shift not only benefits property owners through cost savings but also enhances the overall appeal of properties to environmentally conscious tenants.

In conclusion, the adoption of Smart Building Technologies, particularly BMS and EMS, is essential for modernizing real estate management in Enugu State. These technologies not only improve efficiency and sustainability but also position Enugu as a forward-thinking market in the real estate sector. As the demand for innovative and efficient building solutions continues to grow, embracing these technologies will be vital for the future success of real estate management in the state. Therefore, the study concluded that Smart Building Technologies has a significant positive effect on Real Estate Management in Enugu State.

Recommendations

Based on the positive effects of Smart Building Technologies on real estate management in Enugu State, the following recommendations are proposed:

i. Real estate developers and property managers should prioritize the integration of Building Management Systems in their projects. Training programs should be established to educate stakeholders about the benefits and functionalities of BMS, emphasizing how these systems can enhance operational efficiency and tenant satisfaction.

ii. Stakeholders in the real estate sector should be encouraged to implement Energy Management Systems to optimize energy usage and reduce costs. Workshops and seminars can be organized to raise awareness about the long-term financial and environmental benefits of EMS.

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