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Challenges of Computer- Aided Facility Management systems on Real Estate Buildings in Lagos State.

Adebiyi, S.O and Akinola, V.O
Department of Building, federal University of Technology Akure, Ondo State, Nigeria
Correspondence Author: *Email: saheedabebiyi22@gmail.com*

Abstract: *Computer aided facilities management (CAFM) system are essential for efficient management of built environment. However their implementation of often hundred by technical financial operations strategic and infrastructure challenges. this study artificially device the challenges and remedial measures associated with CAFM system in Lagos State identify effective mitigation strategies. A thematic analysis review that the three most critical challenge facing CAFM system in Lagos State include..... And the most successful media measure employed by stakeholders in the state include training, technical support and maintenance, stakeholders engagement amongst other. The best migration strategy engaged by real estate firm's in Lagos State in proper phase implementation followed by continuous monitoring results from this study will provide valuable insight for facilities managers building owners and stakeholders in Lagos State seeking to reap more benefits from CAFM system.*

Keywords: *Computer: Aided facilities management (CAFM), mitigation strategies, challenges remedial measures, facility management, integration, real estate.*

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I. INTRODUCTION

1. Real estate industry in lagos state
2. Effective FM in real estate building

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ii) Benefits.

3. Overview of CAFM systems

i) CAFM + other technologies
ii) CAFM systems security measures.
iii) Types of CAFM.
iv) Definition

4. Challenges
5. Remedies & Benefits
6. Examples of successful implementation of CAFM system.

INTRODUCTION

The real estate industry plays a vital role in the socio-economic development of Lagos State, Nigeria with a significant impact on the state's infrastructure, employment and GDP. Lagos State, being the economic hub of Nigeria, has experienced repaid urbanization and population growth with very high demand for real development. (Olalekan & Oyedele of statistics, 2020). The real estate industry in lagos state in being faced with growing demand for housing and commercial spaces and increasing investment in infrastructural development such as road, bridges, amongst others. In addition to this, government's initiatives to promote affordable housing and regeneration together with challenges such as inadequate provision of infrastructure, regulatory ensues and environmental concerns have been some of the major characteristics of lagos state real state industry (Ogunba & Ojo, 2020).

Effective facility management (FM) is therefore important for the sustenance of the real estate industry in order to enhance asset value and longevity through effective maintenance and repair management. (Khemanie et al, 2017). It is a used in real estate building development to ensure the optional performance, efficiency and longevity of the assets. It is a critical tool in real estate building development to ensure the optional performance, efficiency and longevity of the assets. Comprises a combination maintenance management energy management space management asset management and risk management for approved of operational efficiency, reduced energy consumption enhanced occupant satisfaction, increased asset value and reduced risks and costs

(lavy et al., 2016; Owen et al, 2018; Kang et al, 2018). While effective FM is instrumental to the geometric development in lagos state, it also comes with challenges such as budget constraints, lack of adequate professionals, problems of climate change and sustainability; regulatory compliance and inadequate technology amongst others and this has led it's the emergence of computer Aided Facility Management (CAFM) systems which services as a key tool to support and enhance facility management practices. CAFM systems are software based solutions designed to support full activities such as space management assets tracker, maintenance scheduling, energy management and work order management (Jylha et al., 2017). According to Amirkhani et al (2020)

CAFM systems are software designed to manage and optimize the apparatus and maintenance of real estate buildings and their associated infrastructure. It facilitates amongst others, effective facility maintenance management space allocation and utilization, workforce management and scheduling contract management and budgeting and cost tracking.

CAFM systems Different types of CAFMS are IWS, CMMS, FMS AND BIM has been successfully implemented of the Empire the state Building in to manage maintenance been employed at the Residences at the Ritz- Carlton, in Los Angeles, U.S.A for property management, maintenance scheduling and resident services. The university of Oxford (UK) also implemented a CAFM system for maintenance management, energy consumption and space allocation. All these examples demonstrate the diverse applications of CAFM systems in real estate buildings.

Despite all the benefits of CAFM systems globally, these still challenge faced as a result of the adoption of this system. These are classified into technical, operational, financial and strategies challenges (Khemani, et al, 2017; Owen et al, 2018, Kand et al, 2018; Amirkhani et al, 2019; Langston et al, 2020, Nelsen). The remedial measure used to minimize these challenges are the definition of clear objective and goals; clear understanding and execution of through needs assessment and feasibility studies, ensuring data accuracy and consistency, choosing scalable and flexible solutions providing continuous training and support, monitoring system performance and making necessary adjustment and fostering collaborator and communication among stakeholders. By understanding these challenges and implementing these redial measures, organization can overcome obstacles and maximize these benefits of CAFM systems.

Computer-Aided facility management (CAFM) system require robust security measures to protect sensitive data, prevent unauthorized access and ensure business continuity. These security measures which include physical, Network, data, application and user can be used to protect organizations CAFM systems data and facilities from potential security threats if well implemented with strict compliance to relevance industry standards and regulations. In order to functionality, efficiency and proper decision- making, CAFM system integrates with various technologies like Building Automation system (BAS) Information Technology (IT) systems, internet of things (IOT) devices, Communication and collaborative tools, Geographic Information systems (GIS); Artificial Intelligence (AI) and machine Learary (ML). Cloud and Mobile Technology. This integration with other technologies has help to enhance data accuracy and consistency operational efficiency and productivity have been improved while better decision- making and reduced costs have also been attributed to this integration.

Definitely, CAFM system the global adoption of CAFM systems has revolutionalised the FM landscape and this has led to the case at which real estate buildings are being managed worldwide. However, research on the adoption and challenges of CAFM systems in Lagos State real estate sector is limited.

Therefore, thin study investigates the challenges of CAFM systems in real estate buildings in lagos state

QUESTIONNAIRE STRUCTURE

a) Types of CAFM systems

i. Integrated Workplace Management Systems (IWMS)
ii. Computerized Maintenance Management Systems (CMMS)
iii. Facility Management Systems (FMS)
iv. Building Information Modeling (BIM)

b) Challenges

i. Technical Challenges

- Integration with existing systems. (HHVAC Security).
- Data compatibility and Standardization.
- System Scalability and flexibility
- Cybersecurity concerns and data protection.
- Software updates and maintenance.
- Interoperability and diverse hardware and software platforms.

- Network connectivity and bandwidth uses.

ii. Financial Challenges
- High initial costs
- Continuous maintenance and support expenses.
- Return on investment (ROT) justification.
- Budget constraints and prioritization
- Cost of training and staffing

iii. Operation Challenges
- Change management and user adoption.
- Date accuracy and consistency
- Information overload and data analysis.
- Workflow automation and process integration.
- Maintenance scheduling and resource allocation.
- Space management and utilization.
- Energy management and sustainability

v.Organizational **Challenges**
- Lack of clear objectives and goals.
- Insufficient stakeholder buy-in and support.
- Inadequate training and user support.
- Resistance to change and cultural barriers.
- Communication breakdown between departments.
- Limited resources and staffing.
- Difficulty in measuring system effectiveness.

v. Implementation Challenges
- Needs assessment and requirement gathering.
- System selection and vendor evaluation.
- Implementation timeline and project management.
- Data migration and integration.
- Testing and quality assurance
- Training and support during implementation.
- Post- implementation evaluation and review.

c) **Remedial measures**

iii. Operational remedies: (Operational remedies).
- Comprehensive training programs for users.
- Clear communication and stakeholder engagement .
- Change management strategies
- Process automation and workflow optimization.
- Performance monitoring and measurements.
- Continuous improvement and feedback loops.
- Regular system audits and assessments.

iii. Financial remedies
- Cost benefit analysis and ROI studies.
- Phased implementation and pilot testing.
- Vendor evaluation and selection criteria.
- Total cost of ownership (TCO) analysis
- Budget allocation and prioritization.
- Grant funding and government incentives.
- Public-private partnerships (PPPs).

iv. Organizational remedies

- Clear objectives and goals.
- Stakeholder buy-in and support
- Cross-functional teams and collaboration.
- Effective communication and feedback.
- Change management and cultural adaptation.
- Performance measurements and evaluation.
- Continuous learning and professional development.

i. **Technical remedies.**

- Regular software updates and patches.
- Data backup and disaster recovery plan.
- Network security measures (firewalls and encryption)
- Integration testing and quality assurance.
- Scalable and flexible system architecture.
- Cloud-based solutions for enhanced accessibility.
- Mobile accessibility for remote management.

v. **Implementation remedies**

- Through needs assessment and feasibility studies.
- System selection and vendor evaluation.
- Implementation project management.
- Date migration and integration planning.
- Testing and quality assurance.
- Training and support during implementation.
- Post-implementation evaluation and review.

d) Mitigation strategies

- Phased Implementation.
- Pilot testing
- User engagement and feedback
- Data Analytics and performance monitoring

II. RESEARCH

2.0 Methodology: Source of data.

The study employed a combination of quantitative and method of assets in challenges of the computer - Aided facility management (CAFM) system in Real estate building in Lagos State.

Research design

The study adopted a descriptive and exploratory you search design examine the challenges of CAFM system challenges remedial measures and mitigation strategies, population and sample.

The stratified random sampling was used to select a sample size 120 respondents which includes facility management, building owners and industry practitioners in Lagos State.

Data collection.

A total of 100 structured question arises were administered to facility manager building owners and real estate professional to collect data on the challenges, remedial measures and mitigation strategies for getting appropriate benefits of CAFM system the questionnaire way validated through expert reviews and prelist testing. Data obtained were analyzed using the statistical package for focal sciences (SPSS) and the regression analysis.

Table1. Types of CAFM system.

Type of CAFM system.	Mean score.	Rank
Integration workplace management system (IWMS).	3.4	1
Computerized maintenance management system (CMMS).	3.16.	3
Facility management software (FMS)	4.2.	1
Building information modeling (BIM).	3.8.	2

Conclusion

The study further reveled that technical challenges particularly integration and data accuracy, Hinder the effectiveness of CAFM system. The system is also limited by financial constraints including implementation costs and ROI justification. Operational challenges such as umber adoption and training impact the utilisation of CAFM system. The success of the system in affected by strategies challenges which includes aligning CAFM with organisation goals

While infrastructural challenges particularly poor internet connectivity and power outage impede the performance of CAFM system

Table 2. Challenges of CAFM system

Challenges	**Mean score**	**Rank**
Technical		
Integration with existing system.	4.20	1
Data compatibility and standardization.	3.90	3
System scalability and flexibility	3.70	4
Software update and maintenance	3.40.	5
Network connectivity and bandwidth issue	4.00.	2
Integration date accuracy and cyber security.	4.20	1
Financial.		
High initial investment cost.	4.35.	2
Continuous maintenance and support expenses.	3.90.	3
Return on investment (ROI) justification.	4.40	1
Budget constraints and prioritization.	3.40	4
Cost of training and staffing.	3.9	3
Operational		
Change management and user adoption	4.30	1
Data accuracy and consistency.	4.10	2
Information overload and data analysis.	3.40	5
Workflow automation and data process integration.	3.90.	3
Maintenance scheduling and resource allocation.	3.20.	4
Space management and utilization.	3.20.	6
Energy management and sustainably.	3.20	6
Organization		
Lack of Clear objective and goals.	3.50	3
Insufficient stakeholders buy in and support.	4.20	1
Resistance to change and cultural barriers.	3.15	5
Communication breakdowns between departments.	3.30	4
Limited resources and staffing.	3.80	2
Difficulty in measuring system effectiveness.	3.10	6
Implementation		
Need assessment and requirements gathering	3.56	4
System selection and rendor evaluation.	3.60	3
Implementation timeline and project management	3.56	4
Data migration and integration.	4.10	1
Testing and quality assurance.	3.35	5
Training and support during implementation.	4.00	2
Post - implementation evaluation and review.	3.20	6
Infrastructure		
Poor internet connectivity.	4.10	1
Power outages.	4.10	2
Strategies.		
Aligning CAFM with organisation goals	4.30	1

Table 3: Remedial Measure

Remedial Measures	**Mean score**	**Rank**
Technical		
Regular software updates and patches	3.95	2
Data backup and disaster recovery plan	3.75	4
Network security measures	3.80	3
Integration testing and quality assurance	4.35	1
Scalable and flexible system architecture	3.40	7
Cloud based solution for enhanced accessibility	3.60	5
Mobile accessibility for remote management	3.45	6
Financial		
Cost-benefit analysis and ROI studies	4.40	1
Phased implementation and pilot testing	4.40	1
Vendor evaluation and selection criteria	3.90	3
Total Cost of Ownership (TCO) analysis	3.75	5
Budget allocation and prioritization	3.60	6
Grant funding and government incentives	3.80	4
Public-Private Partnerships (PPPs)	4.10	2

Operational		
Comprehensive training programs for users	4.20	1
Clear communication and stakeholders engagement	4.20	1
Change management strategies	4.05	2
Process automation and workflow optimization	3.30	4
Performance monitoring and measurements	3.90	3
Continuous improvement and feedback loops	3.40	5
Regular system audits and assessments	3.75	4
Organizational		
Clear objectives and goals		
Stakeholder buy in and support	4.25	1
Cross-functional teams and collaboration	4.10	2
Effective communication and feedback	3.80	4
Change management and cultural adaption	3.70	5
Performance measurements and evaluation	3.90	3
Continuous learning and professional development	3.80	4
Implementation		
Through needs assessment and feasibility studies	3.95	2
System selection and vendor evaluation	3.95	2
Implementation project management	3.40	4
Data migration and integration planning	3.60	3
Testing migration and integration planning	4.30	1
Training and support during implementation	4.30	1
Post-Implementation evaluation and review	3.30	6
Strategic		
Strategic alignment	4.30	1
Stakeholder engagement	4.10	2

III. Data Analysis and discussion of results

The challenges of CAFM systems are grouped into technical financial, operational, organizational, implementation, infrastructure and strategic challenges. High implementation cost and ROI justification were ranked as the major financial challenges while data accuracy and cyber security together with CAFM system integration with other existing systems were ranked as top most technical challenges. Table 2 further revealed that comprehensive, training programs for users and clear communication and stakeholders engagement with a joint mean score of 4.20 were ranked as major operational challenges. Remedial measure for CAFM system are presented in Table 3. The table indicate that training, technical support, integration were ranked as top technical remedies for CAFM system while phased implementation and pilot testing and ROI justification were ranked as most effective financial remedial measure. Strategic alignment and stakeholder engagement were chosen.

IV. Conclusion

The study investigated the challenges of computer - Aided facility management (CAFM) system in the real estate building management in Lagos State. The findings revealed that technical, financial, operational strategies and infrastructure challenges hinder the effective implementation and utilization of CAFM system. The results of this study laid more emphasis on the need for stakeholders to address these challenges in order to optimize the benefits of CAFM

Data Analysis And Presentation

The various types of CAFM system employed in the management of real estate building are presented in Table 1

Table 2 shows the reaction of respondents on the challenges of CAFM system on real estate building in Lagos State.

V. Recommendations

Based on the findings from this study, the following recommendations were made.

(a) There is urgent need for facility manager to develop strategies plans for CAFM system implementation

(b) Building owners are implored to invest in CAFM system infrastructure and maintenance

(c) Stakeholders showed come together and develop guide lines for CAFM system implementation

(d) Policies should be developed by government at all levels to support the adoption of CAFM system

(e) Stakeholders should also promote awareness and training on CAFM system benefits.

The table revealed that FMS was ranked as the most engage CAFM system by facility manager with a mean scores of 4.2 any this is closely followed by BIM. IWNS was ranked an the least used CAFM system for the management of real estate building in Lagos State.

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