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RESEARCH ARTICLE

Facility Managers' Competencies and Smart-Technology Performance in Gated Real-Estate Developments in Ghana

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ABSTRACT

Smart-building technology is becoming increasingly necessary for running contemporary residential estates, including gated communities. However, the effectiveness of this technology relies on handlers' digital competency. In Africa, while building automation systems, such as adaptive HVAC and smart access controls, are being adopted at an increasing rate, assessment of their performance based on human resource capacity has remained underexplored. This study assesses the impact of the qualification and experience of facility managers on the operational performance of smart technology among gated residential communities in Ghana. The study selected 25 facility managers in 25 gated communities in Accra and Takoradi. Using descriptive statistics and interviews, the study assessed factors such as digital literacy, time spent using smart systems/months, training opportunities, and quality indicators for system performance based on uptime, fault response time and tenant satisfaction. The findings show a low level of digital literacy, scarce training opportunities and minimal investment from real-estate companies in upskilling. These shortages are directly linked to slow maintenance response times, excessive system overrides and low tenant satisfaction. The study proposed six critical practical recommendations, including mandatory certification, structured training programmes and procurement-based competency audits. Towards enhancing competency in smart technology it also suggested adoption of performance-based human resource metrics and, most crucially, the introduction of academic courses on smart facilities management or property management technology as an accredited certificate programme or a postgraduate diploma. Thus, this study contributes to the smart estate sector, especially in the Global South.

Keywords: Africa, Facilities management, Ghana, HVAC, Property management, Smart building technologies

1.0 Introduction

In recent times, smart building systems have emerged in developing countries because they improve energy efficiency and user satisfaction in real-estate developments. Evidence in developed real-estate markets shows that the success of smart-building systems stems from workforce competence and training systems (Pittri et al., 2025). Several studies have directly associated smart systems with the certification, digital readiness and training of real-estate professionals (Al-haimi et al., 2025: Al-Rimawi & Nadler, 2025). In Africa, infrastructure for smart systems is accelerating, especially in first-class gated residential developments. For example, in South Africa, Kenya and Nigeria, there is a considerable digital skills gap among facilities management staff (Ebekozien et al., 2024). According to Alhamoudi and Osunsanmi (2025).), the rapid importation of smart-building systems into real-estate development in Africa, without the

associated investment in human resources development, results in systemic inefficiencies.

Over the past two decades, Ghana has experienced a tremendous increase in its residential real-estate sector and faced significant challenges with its human resources, particularly regarding real-estate qualifications (Nortey et al., 2025). According to Norteey et al. (2025), evidence suggests that problems of operational performance affect the post-occupancy phase of a residence. According to Peiris et al. (2025), facility managers are often drawn from traditional land economy and construction backgrounds, with few coming from real-estate backgrounds; consequently, the majority of facility managers may have limited knowledge of emerging smart-building technologies. Despite the proliferation of gated communities with sophisticated smart systems in major urban cities in Ghana, scholars have yet to examine the mismatch between smart-building systems and facility managers' operational capabilities.

Evidence from the Global North on technological adaptation in the real-estate sector consistently highlights the need to integrate workforce development (Cheung, 2025). Further, the Technological Acceptance Model and Human Capital Theory have emphasised perceived usefulness, perceived use and investment in training and education of employees as critical mediators of smart-building systems adoption (Behera et al., 2026). In the face of these theoretical insights, however, there is a lack of empirical data on the effect of facility managers' qualifications and competencies on smart system effectiveness in Ghana's residential real-estate sector. The existing literature on smart systems is focused on public and ICT systems (Nortey et al., 2025). Some studies examine smart systems post-occupancy evaluations while ignoring the human resource aspect. This neglect is likely to create a mismatch between the effectiveness of smart-building systems and job expectations in residential gated communities in Ghana.

Accordingly, this study examines the impact of facility managers' qualifications on the effectiveness of smart systems in Ghana. The study is relevant in several ways. First, contextualising this study in gated communities theoretically contributes to property management discourse, focusing on Africa, where human resource barriers in smart-building systems supersede those in the real-estate sector. This will build on the Technology Acceptance Model (TAM) and Human Capital Theory. Practically, the study provides empirical support that emphasises the consequences of the competence gap and the alignment between human resources approaches and smart building systems requirements, which will be beneficial to property managers, real-estate developers and professional agencies in Ghana.

2. Literature Review

2.1 Human Resource Alignment with Smart Infrastructure Demands

It is imperative to align human resources in smart systems implementation. To be sure, the human capital theory's premise on the need to align competence with job type has produced various views on its success and challenges. Nastase et al. (2025) established that organisations with proactive smart human resources exhibit higher profitability in using technology. While supporting earlier studies, Jasiyah et al. (2025) noted highlighted that trained human resources significantly correlates with positive smart-technology adoption performance. This supports the position of human capital theory that investment in the training and education of human resources produces tangible institutional benefits. Within the PropTech context, Wilkinson et al. (2025) established that PropTech implementation in New Zealand's real estate sector faces the issue of limited staff with both real estate and IT backgrounds, thus affecting the deployment of smart systems such as IoT-controlled HVAC systems. However, Lok et al. (2025) argued that sustainable Human Resource Management practices and competency mapping should match the emerging role of smart systems in the facility management sector. The study by Jatobá et al. (2026) aligns with Lok et al. (2025) but further argues that Artificial Intelligence adoption in Human Resources must be based on competences related to data science and digital literacy during the recruitment and training of staff.

Furthermore, Ghansah (2025) found that a mismatch between facility management staff qualifications and the complexity of using newly

installed smart-building systems occurs because of the neglect of smart competencies in recruitment and outdated hiring standards. Maralapalleet al. (2026) also found that smart mapping of utility systems was ineffective when operators lacked geospatial training, irrespective of their IT skills. On their part, Ilesanmi et al. (2026) observed some challenges with strategic competence alignment, reporting that while training in digital systems improved staff performance, frustration arose from a lack of consistent system upgrades and the authority to implement learned practices.

2.2 Operational Effects of Digital Skills on Smart-Building Management

The emergence of smart systems has transformed the real-estate development sector – from the integration of adaptive Heating Ventilation and Air-conditioning (HVAC) systems and AI-powered facilities and energy systems to predictive maintenance and tenant satisfaction systems. In the face of growing demand for these systems, scholars have highlighted their benefits and effects on the human resource element in facilities management. For instance, Apanavičienė and Shahrabani (2023) assessed smart public buildings in the EU and found that low digital knowledge among technical staff significantly delayed maintenance works and increased system downtime. Similarly, Bao et al. (2026) observed that predictive maintenance systems in Chinese smart offices underperform when technicians lack proper training in understanding system analytics.

Several gaps continue to erupt from integrating smart systems in the real-estate sector. Aldhaheri et al.'s (2022) assessment of smart campuses in the UAE revealed that 40% of installed smart systems were operated below their intended capacity due to staff's inadequate knowledge of interface protocols. In Spain, Martín-Gutiérrez et al. (2023) found low utilisation of smart energy dashboards in residential real estate due to a lack of training among property managers. Similarly, Hassanain et al. (2026) found that low IoT awareness among facility managers correlated withs challenges of HVAC system failures in Saudi Arabia, leading to frequent tenant dissatisfaction. In a similar study in gated communities, underqualified staff showed lower confidence in smart amenities, resulting in poor living conditions caused by erratic temperature control, inadequate lighting systems and faulty access control (Bachman et al., 2022). For Appau et al. (2025) end-user trust in smart technologies is vital for consistent system performance. In other studies, Shahrabani and Apanaviciene (2025) and Darwish et al. (2026) reported that energy efficiency losses occur annually in smart buildings in Kuwait because of improper HVAC programming. However, Al-Rimawi and Nadler (2025) found that smart training programmes improve response time and increase tenant satisfaction scores in Singapore. But there is also the challenge of lack of certification. As this review suggests, therefore, the skills gap presents both benefits and challenges across real-estate sectors worldwide.

3.0 Research Methodology

The study adopted a mixed research method with an explanatory mixed research design based on the pragmatist philosophical stand. Thus, the study adopted both quantitative and qualitative research techniques. The quantitative aspect involved using a survey to assess the competencies of facility managers and their adaptive HVAC operations and performance. The qualitative section involved the use of semi-structured interviews to examine facility managers' experiences, support by firms and training gaps.

Via purposive sampling, the study selected sixteen (16) gated communities in Accra and nine (9) gated communities in Takoradi. These gated communities were selected based on their registration with the Ghana Real Estate Developers Association, Ghana. Two technical selection criteria were also adopted. One, a selected company must have been using adaptive HVAC systems for the past five years. Two, the company must have a professional facility manager. In all, 38 facility managers were sampled for the study. Five gated communities were purposively selected from Accra and Takoradi. For the interviews, facility managers with two years of experience in HVAC systems operations were selected.

3.1 Variable Definition and Measurement

Based on the literature, the study identified four key variables that define the performance of smart-building systems in relation to human resources

qualifications, viz: smart systems operational performance, competence mismatch, organisational support, and facility manager competence. Organisational support was defined as using these indicators: the extent of staff training, budget allocations, and availability of technical resources. Similarly, facility managers' competence was defined to include staff experience with HVAC systems, certifications, digital literacy, and participation in digital training by the firm. Competence mismatch was defined as the difference between required and actual skills, which includes conducting regular digital needs assessments and understanding the complexity of HVAC systems. HVAC systems' operational performance was defined as tenant satisfaction, system uptime, efficient HVAC system functionality under the facility manager, and HVAC fault response time. Facility managers' satisfaction and their digital literacy levels were measured using a five-point Likert scale, where 5 represents 'very high' and one represents 'very low'. System response times were measured every hour and system manual overrides were recorded per month. The system's operation efficiency (system uptime) was measured in percentage. This data was gathered from the resident facility manager. Finally, facility managers' competencies were measured using a five-point Likert scale where 5 = strongly agree and 1 = strongly disagree.

Table 1: Variable definition and Measurement

Construct Name	Indicators	Constructs
Facility Manager Competency	Digital certification status	FMC1
	Years of experience with smart building systems	FMC2
	Participation in ICT or AI and IoT training in the past year	FMC3
	Self-rated digital literacy	FMC4
Smart System Operational Performance	HVAC System uptime	SOP1
	Average response time to system faults	SOP2
	Number of systems overrides per month	SOP3
	Facility Managers' satisfaction with smart features	SOP4
Competency Mismatch	Job description requires digital skills	CMS1
	Facility Manager reports lack of skills for key tasks	CMS2
	Training adequacy perception	CMS3
	Facility Manager's perception of system complexity vs. their skill level	CMS4
Real-Estate Firms' Support for Upskilling	Access to digital training programs	OSU1
	Availability of technical support for smart systems	OSU2
	Frequency of in-house upskilling workshops	OSU3
	Budget allocated for training per manager (GHS)	OSU4

***Source**:* Author's construct, 2025

3.2 Data Analysis Procedures

Quantitative data analysis involved descriptive statistics such as frequencies, means and medians to summarise the demographic and competency profiles of facility managers. For example, the proportion of managers with digital certifications and the average number of years of experience were reported. Average mean scores were used to determine whether differences in competency levels significantly affect operational outcomes.

Qualitative data were analysed through thematic coding to identify patterns and themes related to competency mismatch and operational challenges. This analysis will provide deeper insight into the quantitative findings, particularly areas where statistical patterns may require contextual interpretation. The integration of qualitative and

quantitative findings will support a nuanced understanding of the relationship between facility manager competencies and technology outcomes in Ghanaian gated communities.

4.0 Research Findings

4.1 Biodata of Facility Managers

The study selected 38 residential gated communities that have their companies registered with the Ghana Real Estate Professionals Association. Out of these, 25 responded to the survey (see Table 2), which covered 25 facility managers across various gated communities. The biodata shows that about 72% of the facility managers were between the ages of 20 and 34, comprised by 20% each within the age brackets of 20-24 and 25-29. Across the study locations, 32% of facility manager was within the age of 30-34. Facility managers in the 35-44 age group were 24%. Thus, the data suggests that facility management human resources are extensive and include many youthful professionals. In terms of gender, 56% of the participants were males and 44% were females. This gender balance shows a growing inclusion of women in real estate and property management roles. The implications of these correlations may impact smart-technology use outcomes.

With respect to educational background, Table 2 shows that a significant number of the facility managers have a bachelor's degree, representing 52%, followed by 32% with a master's degree, while Higher National Diploma holders made up 16% of the sample. These findings suggest that most of the facilities have advanced educational backgrounds, which can contribute meaningfully to property management across the study locations. Only about 8% of the facility managers have specialisation in facilities management, which is the most directly related field. Regarding qualifications, other respondents reported holding degrees in the following fields: Land Economy (32%), Real Estate (20%), Estate Management (20%), Construction Management (8%) and Other disciplines (12%).

Table 1: Biodata of respondents

Age	**20-24**	**25-29**	**30-34**	**35-39**	**40-44**	**45-49**	**50-54**	**55-59**	**Total**
Total	5	5	8	4	2	1	0	0	25
Perc (%)	20	20	32	16	8	4	0	0	100

Gender	category	**Total**	**Percentage**
	Male	14	56
	Females	11	44
	Total	25	100

Level of Education	HND	4	16
	Bachelors	13	52
	Masters	8	32
	PhD	0	0
	Total	25	100

Area of Specialisation	Facilities Management	2	8
	Land Economy	8	32
	Real Estate	5	20
	Estate Management	5	20

Construction Management	2	8
Others	3	12
Total	25	100

Source: Field data, 2025

4.2 Operational Competencies of Facility Managers in Gated Residential Estates in Ghana

This section presents survey findings on the operational competencies of facility managers with regard to the use of smart-building systems. Table 3 shows that facility managers were moderately satisfied in using Adaptive-HVAC systems (Mean = 2.8) largely due to user experience and the system's responsiveness. This mean score indicates that satisfaction levels were below average, thus suggesting that most facility managers were not fully comfortable with the operational efficiency of the Adaptive HVAC systems. This moderate dissatisfaction shows the fundamental operational and technical challenges associated with smart HVAC systems.

The HVAC fault response time was very slow (Mean = 9.5), as it takes 9 hours and 50 minutes to respond to faults, with implications for confidence in the system and indoor thermal comfort among tenants. Thus, issues with indoor temperature regulation inevitably affect tenant trust and satisfaction with smart-building technologies.

According to one facility manager:

> [……] System lag is common here. To my little knowledge, the HVAC system is supposed to auto-adjust, but it doesn't. sometimes when I press reset on the app, the system takes too long to respond. Based on this tenants have temperature issues and [it] doesn't help the image of the company. (Facility Manager 6, Takoradi)

This confirms that operational inefficiencies are not only technical issues but also affect the reputation of the real-estate firm involved. The response demonstrates limited technical understanding among some facility managers on the expectations of the reliability of adaptive HVAC systems.

Digital literacy on the part of the facility manager is very low, similar to their levels of satisfaction (Mean = 2.8). This implies that there is limited technical proficiency in managing the smart systems in a considerable number of the buildings in the gated communities. The low digital literacy level implies that many facility managers may scuffle with operating mobile applications and diagnosing faults. Ultimately, this will create dependency on external vendors and weakens the effectiveness of smart HVAC systems implementation across the gated communities. This finding was reinforced by some facility managers in the responses below:

> [……] when I first saw the control panels my perception was that it was an ATM machine. This is our level of knowledge. Smart systems are new things coming up. The company should have trained us on smart apps so that we will be familiar with them [sic]. (Facility Manager 3, Accra, Facility Manager 1, Takoradi).

The study also found that facility managers resort to manual systems of managing the buildings on an average of seven (7) days per month. This indicates the staff's lack of confidence in the system or the possibility of poor automation that needs to be checked in the future. Frequent manual overrides may suggest that the smart HVAC systems are not fully trusted by operators, thereby undermining the purpose of automation. This reduces operational efficiency and increases the risk of inconsistent building performance.

According to a respondent:

> [……] For us, in cases where the systems are malfunctioning, we shut it down and operate the manual way for some time until it is restored. Because we are not technicians, we usually don't want to tamper with it to create a problem, and so manual control has been our backup strategy. Maybe we will get there one day to be smarter [sic]. (Facility Manager 7, Accra, Facility Manager 8, Takoradi).

The above admission highlights a critical training and knowledge gap within Ghana's facility management sector. The unfamiliarity with digital interfaces shows that many facility managers were

introduced to complex smart HVAC systems without adequate preparation. The study also found an average system uptime of 83.6%. This appears very low compared to the expected threshold (95%–99%) for smart-building systems, indicating a clear operational inefficiency in Adaptive-HVAC systems within Ghana's gated communities. For facility managers' experience, the study recorded low values. Table 2 shows that, on average, facility managers have two (2) years and three (3) months of experience with Adaptive-HVAC systems usage. This is insufficient and may affect systems' operationalisation and performance.

Table 3: Operational competencies of facility managers in Ghana

Variable	Mean	Standard Deviation
Facility Managers' Satisfaction	2.8	1.4
Fault Response Time	9.5	2.8
Facility Managers' Digital Literacy	2.8	1.1
HVAC Systems' Manual Overrides	6.7	2.3
Facility Managers' Years of Experience	2.3	1.4
HVAC System Uptime	83.6	5.3

Source: Field data, 2025

4.3 Mismatch between Facility Managers' Competence and Smart-Building Systems Performance

Table 4 presents results on drivers of facility managers' competence on Adaptive-HVAC systems in gated communities in Ghana. Regarding organisation skills support, the study discovered that only 27% of facility managers access training on smart-building systems. This finding supports the perception of some facility managers:

> […...] these systems we see are new, unlike the old ones that have [a] control system [sic] hanged on the walls. These new ones use apps that control the systems, but most of us are not trained. Unfortunately, our responsibility and functions as facilities managers didn't include this, but it has come to meet us. So, we must have some training on them so we can adjust [sic] (Facility Manager 1, Accra; Facility Manager 1, Takoradi).

Furthermore, 31% reported having access to technical support in the firm, which enhances their knowledge of smart systems. Frequency of training in the firms was also low, indicating a mean value of 1.4. According to these respondents, training workshops are not enough and sometimes the firm management does not organise them at all. The study similarly found no training (OSU4) allocations for facility managers in company budgets. This finding is critical and indicates that real-estate development firms are not committed to skill development among staff.

Table 3 presented similar findings related to facility mangers' competence in Ghana. According to the analysis, only 17% of facility managers working in real-estate firms possess knowledge smart-building systems. On average, these facility managers had one and a half years of experience managing smart-building systems. This implies the presence of a large number of facility managers who lack experience of smart-building systems in Ghana's real-estate sector. According to some interviewees:

> […...] For me, honestly, most of the facilities managers in this company were not trained about these new AI-Adaptive systems. For instance, most of them installed in the new developments are largely automated and require some experience to manage them. Sometimes, when a tenant has a challenge in its use and calls us, we have to call the service provider to come and help us out. Sometimes I just reset the whole system or do some trial and error [sic] (Facility Manager 2, Accra, Facility Manager 1, Takoradi).

Among these managers, the study found that about 23% participate in ICT training or AI adaptive smart systems training (FMC3). Also, a small number of staff acquired their skills through personal training (FMC4 = 1.9). Overall, the study found a competence mean of 0.95, meaning that both real-estate firms and managers are unprepared to enhance smart facilities management in Ghana. Some interviewees reported thus:

> [……] when you talk about training, ever since I was employed, I have never seen any training of staff happening in this company. You are there and see vendors installing them and sometimes have to ask them how it works, especially the new HVAC systems. Considering my background in Land Economy, I don't think it's enough to understand new smart systems in our real-estate sector. I will suggest that managers do some training for us so that we don't always have to rely on external vendors for assistance when there is a small problem that we can solve [sic]. (Facility Manager 4, Takoradi, Facility Manager 1, Kumasi).

On the competency mismatch, the study found a disconnect between job demands and facility managers' expectations. As Table 3 shows, most of the jobs require smart skills (Mean = 4.7). Despite these expectations, most facility managers (Mean = 2.6) felt unqualified to manage their facilities and only 21% had received adequate training (CMS3). It was also observed that 67% of facility managers reported that the systems were too complex to manage. Thus, the study shows an average skills gap of 2.045 among facility managers in Ghana's real-estate firms. To assess the system's operational performance, Table 3 indicates that the average fault response time is 8 hours and 6 minutes, suggesting a significant delay in maintenance. Frequent disruptions in the systems, due to manual overrides of 4.7 per month, affected the system's performance. As some respondents noted:

> [……] what I have observed is that when there is a challenge with the HVAC system at night, I receive a lot of calls from tenants. Because the systems look complex, it is very difficult to diagnose the problem and identify the fault. Usually, tenants have to resort to the use of fans or natural ventilation until I call vendors to come and check [at] another time. This usually also happen to the security systems during heavy wind [sic] (Facility Manager 3, Takoradi, Facility Manager 1, Kumasi).

These, among other things, lead to dissatisfaction for facility managers (SOP4), with dissatisfaction with smart systems affecting service delivery in Ghana's smart residential developments.

Table 2: Competence mismatch and smart systems performance in Ghana

Variables	**Construct**	**Mean**	**SD**
Real Estate Firms Support for Upskilling	OSU1	0.27	0.44
	OSU2	0.31	0.48
	OSU3	1.4	0.50
	OSU4	0.0	0.00
Average mean		0.495	
Facility Manager Competency	FMC1	0.17	0.37
	FMC2	1.5	0.50
	FMC3	0.23	0.42
	FMC4	1.9	0.70
Average mean		0.95	
Competency Mismatch	CMS1	4.7	0.31
	CMS2	2.6	0.45
	CMS3	0.21	0.41
	CMS4	0.67	0.47
Average mean		2.045	
Smart System Operational Performance	SOP1	4.6	2.3
	SOP2	8.6	2.5
	SOP3	4.7	2.2
	SOP4	2.6	1.3
Average mean		5.125	

Source: Field data, 2025

5.0 Discussions and Theoretical Contributions

The study assesses facility managers' competence and its effects on system performance. Like Pittri et al. (2025) and Nastase et al. (2025), this study confirms that the competence of facility managers is a key factor in the performance of smart HVAC systems. For instance, the study observed low levels of digital literacy, minimal certification and a lack of training opportunities among facility managers in Ghana's gated communities. This aligns with studies in the UAE and Latin America, where gaps in smart facility management affect smart real-estate developments (Apanavičienė & Shahrabani, 2023; Martín-Gutiérrez et al., 2023). However, regarding the finding on institutional and systemic failure, the present study differs from the literature. Unlike advanced markets such as Singapore and the EU, where human resources training is underutilised (Al-Rimawi & Nadler, 2025), this study found a total absence of budgetary allocation for staff development in Ghana's residential real-estate sector. This is a sharp contrast that requires urgent attention. There are also some critical findings. The high competency mismatch with poor system performance shows a severe disconnect between the preparedness of facility managers and the complexity of smart technologies in Ghana. This challenge seems expensive; however, the high number of manual overrides and the dissatisfaction of facility managers threatens long-term trust in smart systems. This is a likely consequence established by Appau et al. (2025).

Based on the discussions, this study contributes to the smart property and facilities management discourse. Theoretically, the study provides contributions to the Technology Acceptance Model and Human Capital Theory in diverse ways. To be sure, the Human Capital Theory posits that investments in education and training increase productivity and job performance. However, this study found that a significant number of facility managers in Ghana, who possess bachelor's and master's degrees in related fields, have inadequate practical skills and knowledge to operate adaptive HVAC systems efficiently. This implies that acquiring education in the field was not sufficient for managing smart-building systems. Consequently, it is imperative for the theory to evolve to include technology indicators as a strategic investment in human capital, alongside traditional education.

Moreover, while the Technology Acceptance Model posits that user adoption of technology is based on perceived usefulness and ease of use, this study found that institutional and systemic challenges affect the adoption and usefulness of technology. In this study, facility managers demonstrated moderate satisfaction with smart systems, often citing reliance on manual operations, HVAC system complexity and inadequate support from real-estate firms. Thus, it may be observed that perceived usefulness is significantly shaped by real-estate firms' readiness, training availability and technical support. However, these drivers were not incorporated in the TAM, but can form components of the perceived ease of use premise of the theory.

6.0 Conclusions

The study concludes that while the installation of adaptive HVAC and smart access control systems progresses, it would be necessary to equip facility managers in Ghana with the skills required for operating the systems. This addresses a key theoretical gap in the Human Capital Theory and the Technology Acceptance Model that is inadequately applied in smart real-estate studies, particularly in sub-Saharan Africa. Despite the use of these theories in other real-estate studies, this study repositions the discussions on human resources training as a central determinant of smart-building systems across real-estate sectors worldwide. Both the quantitative and qualitative findings converge on issues such as lack of training, minimal organisational support and digital illiteracy as drivers of the competency mismatch across the study locations. However, the findings diverge on system satisfaction. Thus, while the survey recorded moderate dissatisfaction, the interviews suggested more intense dissatisfaction among facility managers. This establishes a more profound underlying frustration among facility managers. This is a critical contribution to the smart property management discourse.

To address facility managers, the International Facilities Management Association must introduce short courses for facility managers working in the residential real-estate sector in Ghana. This can be

done in collaboration with the Ghana Real Estate Developers Association and the Ghana Real Estate Professionals Association. Also, real-estate companies in Ghana should institutionalise continuous professional development programmes that focus on smart-building systems. Universities can also introduce postgraduate programmes on Property Management Technology, which will enhance the digital skills of undergraduates in the fields of Land Economy and Estate Management. At the undergraduate level, universities and technical universities should integrate smart facilities management courses into their real-estate curricula and include industrial training in smart real-estate firms in Ghana. In addition, real-estate companies must understand staff readiness and obtain feedback from facility managers before developing new communities with smart-building features. These recommendations are vital to close the competency gap and explore the potential of smart real-estate systems in Ghana and similar emerging markets in sub-Saharan Africa.

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