Do AI Applications Compromise Ethics and Integrity in Facilities Management? Insights from the UK

Sumanarathna, N.[1], Dahanayake, K. C.[2], & Adhikari, A.[3]

[1]School of the Built Environment, London Metropolitan University, UK

[2]Farnek Services LLC, Dubai, UAE

[3]School of Applied Management, University of Westminster, UK

Corresponding Author: n.sumanarathna@londonmet.ac.uk

ABSTRACT

Background and Aim. AI applications are increasingly being utilised in facilities management (FM) for functions such as operational management, energy management and maintenance management. However, a larger part of the industry would rather use contemporary methods due to ethical and integrity concerns associated with AI applications. Hence, this study attempts to answer the question: Do AI applications compromise ethics and integrity in FM?

Methods. This is a qualitative study. As the research method, in-depth interviews are selected. FM professionals possessing relevant knowledge and experience in the UK have been chosen as experts. Thematic analysis has been adopted to analyse data. As this is ongoing research, preliminary findings obtained from the interview series are presented in this paper.

Results. Findings reveal that ethics and integrity can be compromised if the required security measures are not implemented within the systems and strategies in FM organisations. A framework has been developed to explain ethical AI adoption in FM, recommending alignment with GDPR and ISO standards.

Originality. Although several studies have been carried out exploring the use of AI applications in FM functions and have identified the issue of compromised ethics and integrity, only a few studies have focused on FM organisations and discussed FM-specific solutions. Hence, this study addresses a substantial research gap in FM.

Practical or Societal Implications. This study will motivate FM professionals to adopt AI applications with confidence and contribute to sustainable transformation in FM.

Type of Paper. Full Research

KEYWORDS: AI applications, digital transformation, ethics and integrity, facilities management

INTRODUCTION

Facilities Management (FM) encompasses the synchronised management of both hard FM and soft FM functions to ensure efficient facility performance and optimal working environments. Like other professional fields, Artificial Intelligence (AI) has transformed traditional FM operations and processes. The rapid advancement of AI has transformed FM through automation, predictive analytics, and optimised resource allocation (Marzouk and Zaher, 2020). AI has significantly contributed to reducing the time on facility data analysis, visualisation and data validation (Sampaio, Costa, & Flores-Colen, 2022; Rane, 2023). A few of the most prominent AI applications in FM include AI-based predictive maintenance, data-driven energy optimisation, real-time workplace optimisation, AI-enabled security and surveillance, chatbots and virtual assistants (Chen et al., 2024; Quinello & Nascimento, 2025).

Although digital transformation in FM is promising with AI applications, several challenges and limitations must be addressed. A primary barrier is the complexity of implementation and organisational change management. The substantial costs associated with IoT sensors, AI software,

and system integration often create financial barriers to adoption (Atkin and Bildsten, 2017). Furthermore, modifications to traditional workflows generate resistance among stakeholders. Data quality, privacy, bias, and governance are key aspects to be addressed prior to adopting AI-based transformation (Alhaj et al., 2022).

Importantly, the increasing use of AI in FM brings to light a range of ethical considerations that go beyond technical challenges. The quality and completeness of the datasets directly impact the accuracy of the decision-making. In addition, cybersecurity vulnerabilities in interconnected systems further compound risks by exposing sensitive operational and occupant data (Assaf et al., 2020). AI applications like facial recognition and occupant tracking raise significant ethical concerns regarding surveillance and personal privacy. Establishing robust governance protocols is essential to ensure responsible AI deployment while maintaining regulatory compliance and public trust. The rapid adoption of AI technologies has outpaced the development of robust ethical guidelines and governance frameworks, raising critical concerns about privacy violations, algorithmic bias, accountability gaps, and data integrity.

Recent UK-based commentary and cross-sectoral studies have also raised concerns around the ethical implications of AI in FM. Issues such as data ownership, surveillance, transparency, and reputational ethics are emerging as key themes in industry guidance and organisational responses (IWFM, 2017; RICS, 2024a; RICS, 2024b; Stahl et al., 2021). While these discussions provide important context, they also highlight the need for empirical, sector-specific research to understand how such concerns are interpreted and managed in FM practice. However, existing studies focus narrowly on the ethical and integrity-related challenges of AI adoption in FM, and only a few, such as Rane (2023), Almeida et al. (2022) and Stahl et al. (2021), explore how these issues are perceived and managed by professionals irrespective of the sector/industry. Despite several systematic reviews and theoretical studies, such as Soulami et al. (2024), empirical research that explores the ethical dilemmas surrounding AI adoption in FM remains scarce. Moreover, FM-specific research grounded in ethical governance frameworks remains limited, particularly in the UK context. This study addresses that gap by investigating how FM professionals in the UK understand, experience, and respond to the ethical implications of AI technologies.

Hence, this study attempts to answer the question: Do AI applications compromise ethics and integrity in FM? More specifically, it investigates:

- What ethical concerns are associated with AI adoption in FM functions?
- How are these concerns currently addressed within FM organisations?
- What strategies or frameworks are needed to support responsible and ethical AI integration in FM?

This is ongoing research. This paper presents the preliminary findings from the first phase of expert interviews within the UK FM sector. Hence, this study contributes to ongoing debates around AI ethics in applied settings and offers practical insights into responsible innovation in the built environment.

LITERATURE STUDY

AI Applications in Facilities Management

AI is increasingly transforming FM practices, moving organisations from reactive operations to proactive, data-driven decision-making. Recent studies highlight several domains where AI technologies are most impactful, including predictive maintenance, energy efficiency, workplace optimisation, space utilisation, service automation, and soft FM services such as facility operations and administration (Marzouk and Zaher, 2020; Quinello & Nascimento, 2025; Atkin and Bildsten, 2017).

Predictive maintenance has emerged as one of the most prominent AI applications, where real-time condition data from sensors is used to forecast asset performance and detect anomalies before failure occurs (Cheng et al., 2020; Zhang et al., 2022). This helps reduce unplanned downtime, lower

maintenance costs, and extend asset lifespan. AI-integrated Building Information Modelling (BIM) systems and IoT platforms further support emergency planning, building diagnostics, and fault prediction (Quinello & Nascimento, 2025). AI technologies also play a central role in building energy management. Smart control of HVAC, lighting, and power systems is increasingly enabled by machine learning algorithms that adjust system operations based on environmental conditions, occupancy, and historical usage patterns (Hosamo and Mazzetto, 2024). These insights are particularly relevant in hybrid work models and agile environments where space demand fluctuates (Vinnakota et al., 2022; Soulami et al., 2024). Soft FM services such as housekeeping, catering, and customer service also benefit from AI-supported scheduling, staff deployment, and quality monitoring (Atkin and Bildsten, 2017). These tools not only improve service delivery but also optimise resource allocation.

Natural Language Processing (NLP) tools are increasingly used to automate communications in FM (Assaf & Srour, 2020; Albeshr et al., 2024). Generative AI tools such as ChatGPT have recently entered FM applications, assisting with documentation, reporting, and access to regulatory or technical information (Cheng et al., 2020; Rane, 2023). To address concerns about opaque decision-making, the concept of Explainable AI (XAI) has gained traction in FM. Transparent, voice-activated systems help users understand how AI decisions are made and build trust in automated service processes (Robert et al., 2020). This is especially important when AI influences decisions about occupant comfort, building safety, or service prioritisation. A summary of the major FM functions and their corresponding AI applications is presented in Table 1.

Table 1 Previous research on AI adoption in FM functions

FM Function	AI application	References
Predictive maintenance	- Big data analytics using ML - Deep Learning for fault detection - Digital Twins for diagnostics - Computer Vision (CV) for equipment condition monitoring	Assaf & Srour (2020); Bouabdallaoui et al. (2021); Cheng et al. (2020); Hosamo et al. (2022); Marzouk & Zaher (2020); Rane (2023); Soulami et al., (2024); Vinnakota et al. (2022
Energy management	- ML for energy forecasting - Fault detection and diagnostics - Time Series Forecasting - Reinforcement Learning (RL) for energy optimisation - BIM-IoT integration for real-time performance adjustment	Assaf & Srour (2020); Chen et al. (2024); Hosamo et al. (2022); Hosamo & Mazzetto (2024); Rane (2023); Soulami et al. (2024); Vinnakota et al. (2022); Zhang et al. (2022)
Space Utilisation and Workplace Optimisation	- ML for occupancy prediction - CV for real-time occupancy analytics - Clustering for usage patterns - Fairness-aware AI for equitable planning	Rane (2023); Soulami et al. (2024); Vinnakota et al. (2022); Zhang et al. (2022)
Security and Surveillance	- CV and Deep Learning for threat detection and facial recognition - NLP for command interpretation and incident reporting - Behavioural analytics using ML - Graph algorithms for access flow - Anomaly detection	Robert et al. (2020); Stoilova (2021); Vinnakota et al. (2022)
Soft FM (Facility Operations and Administration)	- Robotics with CV and SLAM for cleaning and navigation - NLP-based chatbots and virtual assistants - Reinforcement Learning for Task Automation - Intelligent Process Automation (IPA) for administrative efficiency	Albeshr et al. (2024); Alhaj et al. (2022); Atkin and Bildsten (2017); Bouabdallaoui et al. (2021); Chen et al. (2021); Chen and Tsai (2021); Hosamo and Mazzetto (2024); Marzouk and Zaher (2020); Pedral Sampaio et al. (2022); Rane (2023); Stoilova (2021); Vinnakota et al. (2022).

ETHICAL CONSIDERATIONS

The ethical concerns on AI adoption span multiple aspects, with privacy, fairness, accountability, and job displacement being central issues. Facial recognition technology raises significant privacy and security concerns, as it involves the collection and processing of sensitive personal data, which can be

vulnerable to misuse, breaches, or unauthorised access. Data protection concerns arise with large language models (LLMs) as employees may inadvertently input confidential data or documents when generating reports or analyses, increasing the risk of data leakage and unauthorised access (Rane, 2023). Moreover, biases inherent in AI decision-making may lead to unfair outcomes in areas like space optimisation. Biases in training data can result in unfair outcomes, marginalising certain groups or reinforcing existing inequalities (Jia et al., 2021). In employee management, this may manifest in biased recruitment or performance evaluation processes (Robert et al., 2020). The decisions of AI systems are questionable due to their black box nature (Robert et al., 2020).

AI's increasing role presents concerns related to the displacement of human labour and the reduction of job opportunities, with automation threatening specific job roles (Liang et al., 2024). Prioritising efficiency over social equity and environmental justice in AI deployment may exacerbate existing societal inequalities, disproportionately benefiting certain groups while disadvantaging others (Golkarfard et al., 2025). Furthermore, the absence of human experience in AI-driven systems, such as chatbots and virtual assistants, can lead to feelings of neglect among users, who may miss the emotional and empathetic elements of human interaction.

Industry bodies have also emphasised these risks. IWFM (2017) cautioned that AI adoption in FM may progress faster than ethical governance, highlighting the need for clearer rules on data ownership, accountability, and privacy. RICS (2024a) has underlined that FM professionals cannot hand over responsibility for ethical AI to vendors, while RICS (2024b) noted that many organisations remain underprepared for compliance and governance challenges. Similarly, Almeida et al. (2022) highlight the ethical tensions of facial recognition technologies, recommending stronger regulatory alignment, transparency, and accountability measures. Stahl et al. (2021) further argue that organisational ethics responses are often fragmented and reputationally driven rather than embedded in governance structure. Together, these studies reveal a persistent gap between ethical awareness and practice in FM.

MANAGING ETHICAL CONSIDERATIONS

The ethical considerations of AI systems, ranging from architecture to employee management, are complex, demanding proactive and thorough management. One of the primary concerns is privacy and security, particularly with technologies like facial recognition, which raise significant risks related to data protection and potential leaks (Almeida et al., 2022). Deploying facial recognition ethically requires transparent user consent (Bouabdallaoui et al., 2021). Furthermore, AI's dependence on large datasets increases the likelihood of inadvertent breaches, especially when employees input confidential documents or proprietary information into systems such as LLMs for analysis or reporting. Organisations must prioritise stringent data protection measures and establish clear protocols for safeguarding sensitive data (Assaf et al., 2020). Nolte et al. (2025) stated that memorisation of personal data by LLMs raises new obligations under GDPR, making accountability a key consideration.

Ensuring fairness in AI systems requires conscious efforts to incorporate diverse perspectives throughout the design and development stages. Moreover, the lack of transparency and explainability in many AI systems, often referred to as the "black box" problem, undermines trust in AI-driven decisions (Jia et al., 2021; Robert et al., 2020). This concern calls for AI solutions that are not only effective but also explainable, offering justifiable and evidence-based reasoning for their actions (Liang et al., 2024). AI systems in FM require careful implementation to enhance human capabilities rather than replacing workers (Mehdi et al., 2021). As AI continues to evolve, organisations must develop ethical governance frameworks that address these challenges, ensuring that AI integration is both responsible and beneficial to all stakeholders (e.g., Almeida et al., 2022). Almeida et al. (2022) specifically recommend Data Protection Impact Assessments (DPIAs), transparency requirements, and audit mechanisms to strengthen accountability.

To address these challenges, comprehensive regulatory frameworks are needed to guide the responsible development and deployment of AI technologies, ensuring they serve societal well-being

while safeguarding privacy, fairness, and job security (Golkarfard et al., 2025). However, Stahl et al. (2021) note that many organisational responses remain fragmented and reactive, creating uncertainty for professionals tasked with overseeing AI. Industry bodies also call for stronger governance. For instance, IWFM (2017) stressed the urgency of FM-specific ethical standards, and RICS (2024a) reaffirmed that accountability must remain with professionals, not systems. RICS (2024b) further highlighted the need for training and awareness across FM organisations to bridge the gap between ethics in principle and ethics in practice.

Finally, cultural reluctance remains a barrier to adoption. As by Zhang et al. (2022), organisational and regional culture significantly influence digital transformation in FM. Overcoming this requires not only robust governance but also stakeholder engagement to align AI systems with user expectations. Encouraging a culture of critical engagement with AI is essential to realising its potential responsibly. Despite these developments, limited empirical evidence exists on how FM professionals perceive and act on these challenges. This study, therefore, investigates how ethical considerations are understood and managed within FM organisations in the UK, contributing practice-informed insights into responsible AI adoption.

METHODS AND DATA

This study adopts a qualitative research methodology to explore the current landscape of AI adoption in the FM sector in the UK. The primary research method employed was an interview survey, with data collected through semi-structured interviews. Expert participants were identified through personal networking and by attending relevant public exhibitions and industry conferences within the UK. Selection criteria included demonstrable expertise in AI adoption within the FM field and current professional engagement in the UK industry. A total of three expert interviews were conducted during this initial phase of the study. In addition to the literature study, the presentations and panel discussions held at the Workplace and health and safety events from 8-10 April 2025, in Birmingham, have been useful in formulating the interview guideline with the knowledge attained on the current industry practice. The purpose of these interviews was twofold: first, to determine whether AI is actively being adopted in the FM sector, and second, to gain insights into the potential ethical considerations associated with such adoption.

During the interviews, participants were asked a series of questions designed to explore their perspectives on AI adoption in FM. The questions began with an introduction to the participants and their roles, followed by an assessment of their familiarity with AI applications in FM (e.g., *Briefly introduce yourself and your role, what is your level of familiarity with AI applications in FM?*). They were invited to share their perceptions of AI adoption, identify FM functions that benefit most from AI, and provide examples of practical applications (e.g., *How do you perceive AI adoption in FM?, what are the key FM functions that benefit the most from AI applications?, and can you share some examples of AI applications in FM?*). The discussion also examined the challenges associated with adopting AI, including ethical concerns, regulatory and professional barriers, and potential strategies or policies to overcome these obstacles (e.g., *What are the biggest challenges in adopting AI within the FM sector?, What ethical concerns arise from the use of AI in FM?, are there regulatory or professional barriers affecting AI adoption in FM?, and what strategies or policies could help mitigate these barriers?*). Finally, participants were asked about organisational approaches to training employees in AI adoption, ensuring a comprehensive understanding of current practices and challenges (e.g., *How does your organisation train employees in AI adoption?*).

Insights and views obtained from the participants through interviews were analysed using thematic analysis. As this is the initial stage of this research, the data was analysed manually, generating only three themes, which are a) the level of AI adoption in FM functions or tasks, b) ethical considerations and c) overcoming ethics-related challenges and opportunities towards smart FM. As the next step, a case study will be carried out to explore these aspects in the context of the UK.

RESULTS

Preliminary Interview Series

Table 2 below presents the details of the interviewees.

Table 2 Details of the interviewees

Interviewee code	Job position	Organisation type	Years of experience in the FM industry	Highest educational/ professional qualifcn
I-01	Fire Risk Assessor	Non-profit housing association	10+ years	MSc in PM
I-02	Business Development Manager	Mobile computing software company	20+ years	Diploma in FM and Diploma in PM; FMP; APM
I-03	Founder of a Business Mgt Consultant firm	FM Consultant	11+ years	High School Diploma

Theme 1: The level of AI adoption in FM functions and tasks

With regards to the AI adoption in the FM field, interviewee I-01, who has been working as a Fire Risk Assessor in the UK, and has solid FM background, stated that some functions, such as preventive maintenance and energy management might benefit from using AI (i.e., machine learning) particularly for decision making. However, it cannot replace the requirement for human touch for certain tasks, such as customer services embedded in FM tasks, at least in the UK context. Interviewee I-01 further explained this view as below.

I am worried about losing the human touch and experience. Our organisation still uses a 24-hour customer service call line, and I think it's better, especially since our customers come from different backgrounds. Some aren't great with technology. For example, if we introduce a chatbot, it might be difficult for them to navigate... (I-01).

However, interviewee I-02, who is a Business Development Manager of an IT organisation, is optimistic about the current atmosphere of AI adoption and justified his stance as below.

We develop AI-driven smart solutions to enhance the experience of building occupants. We have several clients in the UK who use our products for facilities management functions...what we created was a kind of independent data layer for smart buildings, where whatever sensors you have in a building, we get all that data. We normalise the data and we show it to you in a meaningful way... (I-02). If you want to see your energy consumption, you want to see the air quality, you want to see the lighting, we put all this together to make sense to you...Based on data, we help you reduce waste (I-02).

Theme 2: Ethical considerations

Interviewee I-02, on the other hand, explained that there were no ethics-related issues or misalignment with GDPR, as they had successfully launched smart solutions for soft FM. I-02 further elaborated on this insight as follows:

Our work is aligned with GDPR. We protect users' confidentiality and privacy by only collecting IP addresses, which are deleted after 48 hours. This data helps with minor tasks like cleaning, which might seem small but are really important for workplace management... (I-02).

Let's say the toilet paper runs out in the washroom. Employees can inform management through their mobile phones. These types of data are useful for real-time solutions and help with decision-making in the long run (I-02).

However, I-02 agreed with the fact that there will be discomfort involved with collecting a certain type of data from employees at the organisational level. For example,

When a badge is used to record access and departure times, employees started questioning, but why do you need this?... Is someone going to look at my badge to know when I come in? What is HR going to do about it? (I-02)

Hence, they had to clarify all these queries, and before collecting data, alignment with the European Union Time Act was also needed. The interviewee I-02 further expressed on the current regulations on ethical consideration and highlighted that it is a "wild west" situation, and they have not been figured out completely.

Theme 3: Overcoming ethics-related challenges and opportunities towards smart FM

Both interviewees, I-02 and I-03, agreed that employees should be provided with proper training on boundaries regarding AI adoption, particularly on the use of LLMs such as ChatGPT. While there is a lack of standards or regulations on AI adoption in FM, it is up to organisations to implement bespoke systems that align with existing regulations such as GDPR and ISO 10016 FM.

Interviewee I-03 has been involved in developing ISO 10016 FM, which is a series of standards related to quality management systems. Although FM does not have a direct definition within this standard, it is still relevant due to its common use in the building management context.

Interviewee I-02 explained how their organisation implements and aligns with standardisation as *"When you think about smart buildings, there's still a lot of bespoke setups. We say, let's make it more standardised. So we make things interchangeable…We are a part of the Smart Building Council."*

Regarding the future of FM practice in terms of AI adoption, both I-02 and I-03 have been positive. According to I-02, AI can be incorporated to enhance the productivity of decision-making. For instance, 'let's say errors are found in a fault detection system of a smart building and a total of 500,000 errors have been detected, AI can learn about alarms and detect fault notifications or filter serious issues.'

According to interviewees I-02 and I-03, the reluctance to adopt AI is a cultural phenomenon. Hence, together with policy development and implementation, understanding the requirements of stakeholders or end users is necessary to move towards smart FM.

DISCUSSION

AI adoption in FM has not been extensively researched, as it is still an emerging topic. Moreover, the existing empirical findings are largely based on research conducted as pilot studies, rather than studies undertaken within the industry using real datasets (e.g., Hosamo and Mazzetto,2024). Hence, this study aimed to explore the level of AI adoption in the FM industry and the probable ethical considerations that occur as a result.

Findings of this study reveal that there are organisations in the UK actively using AI in several FM tasks, such as workplace management (i.e., housekeeping), energy management, and operations management (e.g., chatbots and ChatGPT). These findings align with prior research implications, particularly on the use of GenAI in almost every FM function (e.g., Vinnakota et al., 2022). Similarly, Chen and Tsai's (2021) implications regarding the perks of using chatbots for producing progress reports on building inspection, housekeeping, preventive maintenance and disaster prevention through data analysis attained from chatbots are validated by the preliminary findings.

Furthermore, findings confirm that measures can be taken to address potential ethical considerations, including data protection and security in the real world. For instance, Interviewee I-03 explained that there were no ethics-related issues or misalignment with GDPR, as they protect users' confidentiality and privacy by collecting anonymous data and only collecting IP addresses, which are deleted after 48 hours. Nevertheless, diverse perspectives must be incorporated in the design and training of AI systems to ensure fairness. For example, obtaining user consent, implementing an efficient cloud management system with high security, and conducting regular progress reviews when both machines and humans are involved in decision-making are suggested as appropriate measures to ensure ethical practice (Jia et al., 2021). It is also suggested that integrating a central AI system across FM functions can ensure consistency, transparency and better oversight (Jia et al., 2021).

The absence of standardised regulations governing AI adoption in FM, as highlighted by the interviewees, necessitates organisations to develop bespoke systems that comply with existing frameworks such as the GDPR and ISO standards (e.g., ISO 10016 FM). This approach resonates with the perspectives of Abdelalim et al. (2025), IWFM (2017), RICS (2024a) and (2024b), who advocate for the integration of AI within established quality management systems to ensure ethical compliance and operational efficiency.

Interviewee I-02's involvement with the Smart Building Council and the push towards standardisation in smart buildings reflects a growing trend in FM to adopt standardised solutions. This movement is corroborated by the work of Abdelalim et al. (2025), who emphasise the role of standardised frameworks in facilitating the seamless integration of AI and digital twin technologies into BIM systems, thereby enhancing predictive maintenance and operational efficiency.

Addressing ethical challenges in smart FM starts with equipping employees through targeted training. Clear guidance on the responsible use of AI tools, like ChatGPT, helps staff understand what's appropriate, particularly around data privacy and decision-making (Soulami et al., 2024). Robert et al. (2020), in their study, point out the unfairness caused by rapidly deploying AI systems to manage employees, utilising the organisational justice theory. It has been further explored that the complex issues that arise, other than protecting employees' privacy, such as determining autonomy in AI in decision-making and the means of holding AI accountable. These aspects should be taken into consideration when developing and modifying organisational structures, policies and norms.

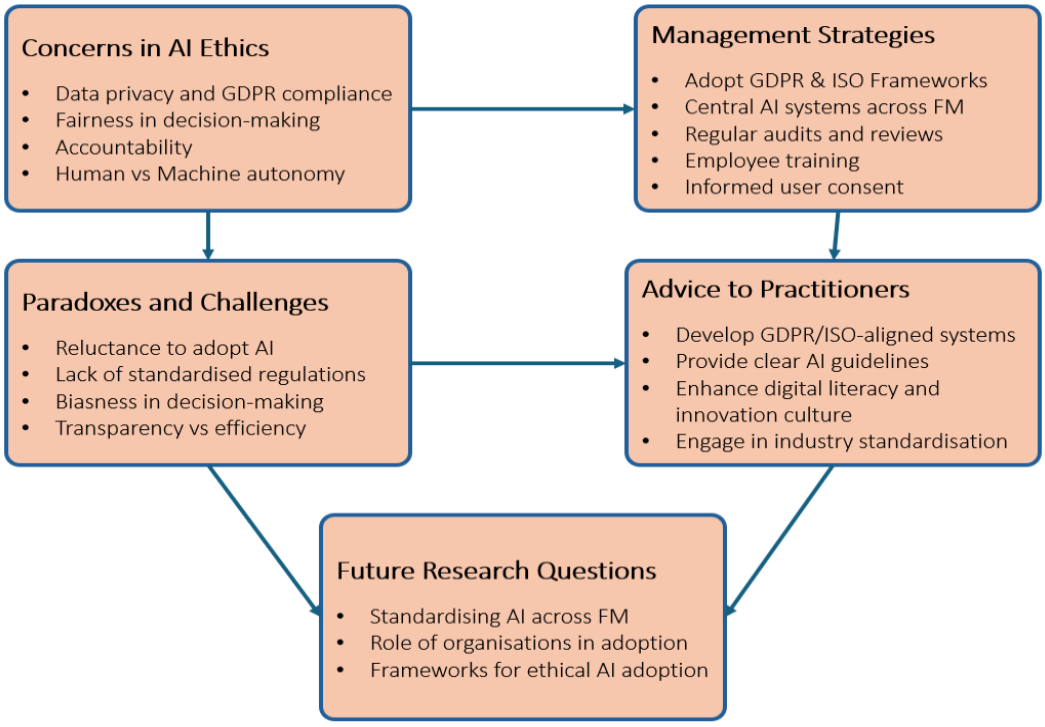

Figure 1 The framework for ethical AI adoption in FM. Source: Authors' own work.

However, the cultural reluctance to adopt AI, as noted by all the interviewees, presents a significant barrier. This sentiment is echoed in the literature, where organisational culture (even the culture in the region/country) is identified as a critical factor influencing the successful implementation of AI technologies. Addressing this requires not only policy development and stakeholder engagement but also a joint effort to foster a culture that embraces technological innovation. Together, these steps create a practical path for managing ethical risks while making the most of smart technologies

(Zhang et al., 2022). Accordingly, the framework presented in Figure 1 has been developed to explain ethical AI adoption in FM. The framework will be further refined and validated through future research.

CONCLUSIONS

This study set out to explore whether AI applications compromise ethics and integrity in Facilities Management, with a particular focus on current practices and perspectives within the UK context. Based on a literature review and preliminary interview findings, the study identified that AI is increasingly being integrated into several FM functions, including maintenance, energy management, and workplace optimisation. While these applications offer numerous benefits, they also present a range of ethical challenges.

The findings highlight issues such as data privacy, surveillance, algorithmic bias, and the lack of transparency in AI decision-making are central to ethical concerns. However, the study also revealed that these risks can be mitigated through appropriate governance measures. Aligning AI systems with frameworks such as GDPR and ISO standards, offering staff training on responsible AI use, and adopting transparent and inclusive design approaches emerged as key strategies for addressing ethical challenges.

As a limitation, the findings presented in this study are based on only three expert interviews, reflecting the challenges of data collection due to the limited availability of industry professionals and the sensitivity of the topic. Nevertheless, the insights gained offer a valuable foundation for future research by highlighting key ethical concerns and mitigation strategies in AI adoption within FM. The planned case study is anticipated to provide more comprehensive and contextualised insights into the practical implications of ethical AI integration, ultimately contributing to the development of context-specific guidelines that support responsible and ethical AI practices in Facilities Management.

AI DECLARATION

Language editing was carried out with AI-assisted tools to enhance readability and presentation, without generating or modifying the scholarly content.

REFERENCES

Abdelalim, A. M., Essawy, A., Sherif, A., Salem, M., Al-Adwani, M., & Abdullah, M. S. (2025). Optimizing Facilities Management Through Artificial Intelligence and Digital Twin Technology in Mega-Facilities. *Sustainability*, 17(5), 1826. Available at: https://doi.org/10.3390/su17051826

Albeshr, A. M., Alnajjar, F., Abdulmouti, H., & Mubin, O. (2024). Enhancing Service Management in Industry 4.0: The Role of AI-Powered Chatbots. In *2024 Advances in Science and Engineering Technology International Conferences (ASET)* (pp. 1-5). IEEE. Available at: https://doi.org/10.1109/ASET60340.2024.10708742

Alhaj, M. B., Liu, H., Abudayyeh, O., & Sulaiman, M. (2022). Development of a mobile application for occupant-centric facility maintenance management. In *2022 IEEE World AI IoT Congress (AIIoT)* (pp. 323-329). IEEE. Available at: https://doi.org/10.1109/AIIoT54504.2022.9817248

Almeida, D., Shmarko, K., & Lomas, E. (2022). The ethics of facial recognition technologies, surveillance, and accountability in an age of artificial intelligence: a comparative analysis of US, EU, and UK regulatory frameworks. *AI and Ethics*, 2(3), 377-387. Available at: https://doi.org/10.1007/s43681-021-00077-w

Assaf, S., Awada, M., & Srour, I. (2020). Data driven approach to forecast building occupant complaints. In *Construction Research Congress 2020* (pp. 172-180). Reston, VA: American Society of Civil Engineers. Available at: https://ascelibrary.org/doi/abs/10.1061/9780784482865.019

Atkin, B., & Bildsten, L. (2017). A future for facility management. *Construction Innovation, 17*(2), 116-124. Available at: https://doi.org/10.1108/CI-11-2016-0059

Bouabdallaoui, Y., Lafhaj, Z., Yim, P., Ducoulombier, L., & Bennadji, B. (2021). Predictive maintenance in building facilities: A machine learning-based approach. *Sensors, 21*(4), 1044. Available at: https://doi.org/10.3390/s21041044

Chen, S., Ge, W., Liang, X., Jin, X., & Du, Z. (2024). Lifelong learning with deep conditional generative replay for dynamic and adaptive modeling towards net zero emissions target in building energy system. *Applied Energy, 353*, 122189. Available at: https://doi.org/10.1016/j.apenergy.2023.122189

Chen, K. L., & Tsai, M. H. (2021). Conversation-based information delivery method for facility management. *Sensors, 21*(14), 4771. Available at: https://doi.org/10.3390/s21144771

Cheng, J. C. P., Chen, W., Chen, K., & Wang, Q. (2020). Data-driven predictive maintenance planning framework for MEP components based on BIM and IoT using machine learning algorithms. *Automation in Construction, 112*, 103087. Available at: https://doi.org/10.1016/j.autcon.2020.103087

Golkarfard, A., Sadeghmalakabadi, S., Talebian, S., Basirat, S., & Golchin, N. (2025). Ethical challenges of AI integration in architecture and built environment. *Current Opinion, 5*(2), 1136-1147. Available at: https://doi.org/10.1016/j.coviro.2025.02.010

Hosamo, H. H., Svennevig, P. R., Svidt, K., Han, D., & Nielsen, H. K. (2022). A Digital Twin predictive maintenance framework of air handling units based on automatic fault detection and diagnostics. *Energy and Buildings, 261*, 111988. Available at: https://doi.org/10.1016/j.enbuild.2022.111988

Hosamo, H., & Mazzetto, S. (2024). Performance Evaluation of Machine Learning Models for Predicting Energy Consumption and Occupant Dissatisfaction in Buildings. *Buildings, 15*(1), 39. Available at: https://doi.org/10.3390/buildings15010039

IWFM (2017). BIFM submission to the Call for Evidence on Artificial Intelligence. Institute of Workplace and Facilities Management. (House of Lords Select Committee on AI). Available at: https://www.iwfm.org.uk/static/72dd464d-b746-4e59-ae23a8796fb459ba/IWFM-submission-to-the-Parliamentary-inquiry-on-Artificial-Intelligence.pdf

Jia, W., Zhang, X., & Song, W. (2021). Ensuring fairness in AI-driven space optimization: A conscious effort to include diverse perspectives in design and training. *Journal of AI Ethics, 12*(4), 29-41. Available at: https://doi.org/10.1007/s42326-021-00087-6

Liang, C. J., Le, T. H., Ham, Y., Mantha, B. R., Cheng, M. H., & Lin, J. J. (2024). Ethics of artificial intelligence and robotics in the architecture, engineering, and construction industry. *Automation in Construction, 162*, 105369. Available at: https://doi.org/10.1016/j.autcon.2024.105369

Marzouk, M., & Zaher, M. (2020). Artificial intelligence exploitation in facility management using deep learning. *Construction Innovation, 20*(4), 609-624. Available at: https://doi.org/10.1108/CI-12-2019-0138

Mehdi, M., Smith, S., & Lucas, P. (2021). The integration of AI in facility management: Enhancing human capabilities rather than replacing workers. *Journal of Facility Management, 24*(6), 8-21. Available at: https://doi.org/10.1108/JFM-04-2021-0043

Nolte, T., Finck, M., & Meding, K. (2025). Machine learners should acknowledge the legal implications of large language models as personal data. *arXiv preprint arXiv:2503.01630v2*. Available at: https://arxiv.org/abs/2503.01630v2

Quinello, R., & de Souza Nascimento, P. T. (2025). The use of artificial intelligence in facilities management: Potential applications from systematic literature review. *Artificial Intelligence and Applications*. Available at: https://doi.org/10.47852/bonviewAIA52023691

Rane, N. (2023). Role of ChatGPT and similar generative artificial intelligence (AI) in construction industry. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4598258

RICS (2024a). *Professional conduct and the responsible use of AI*. Royal Institution of Chartered Surveyors. Available at: https://www.rics.org/news-insights/wbef/professional-conduct-responsible-use-ai

RICS (2024b). What impact will AI have on facility management? Royal Institution of Chartered Surveyors. Available at: https://www.rics.org/news-insights/what-impact-will-ai-have-on-facility-management

Robert, L. P., Pierce, C., Marquis, L., Kim, S., & Alahmad, R. (2020). Designing fair AI for managing employees in organizations: A review, critique, and design agenda. *Human–Computer Interaction, 35*(5-6), 545-575. Available at: https://doi.org/10.1080/07370024.2020.1735391

Sampaio, P. R., Aguiar Costa, A., & Flores-Colen, I. (2022). A systematic review of artificial intelligence applied to facility management in the building information modeling context and future research directions. *Buildings, 12*(11), 1939. Available at: https://doi.org/10.3390/buildings12111939

Soulami, M., Benchekroun, S., & Galiulina, A. (2024). Exploring how AI adoption in the workplace affects employees: A bibliometric and systematic review. *Frontiers in Artificial Intelligence, 7*, 1473872. Available at: https://doi.org/10.3389/frai.2024.1473872

Stahl, B. C., Antoniou, J., Ryan, M., Macnish, K., and Jiya, T. (2021). Organisational responses to the ethical issues of artificial intelligence. *AI & Society*, 37, pp. 23–37. Available at: https://doi.org/10.1007/s00146-021-01148-6

Stoilova, E. (2021). AI chatbots as a customer service and support tool. *ROBONOMICS: The Journal of the Automated Economy, 2*, 21-21. Available at: https://www.journal.robonomics.science/index.php/rj/article/view/2

Vinnakota, S., Mohan, M. D., Boda, J., Sekuini, J., Mustafa, M., & Madala, H. (2022). Leveraging artificial intelligence in the hospitality industry: Opportunities and challenges. *Asian Journal of Social Science and Management Technology, 5*(3), 201-261. Available at: https://www.ajssmt.com/Papers/53201260.pdf

Zhang, F., Chan, A. P., Darko, A., Chen, Z., & Li, D. (2022). Integrated applications of building information modeling and artificial intelligence techniques in the AEC/FM industry. *Automation in Construction, 139*, 104289. Available at: https://doi.org/10.1016/j.autcon.2022.104289