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Generative AI for BIM-based Digital Construction Cost Management: A Qualitative Sentiment Analysis Approach

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Abstract

This study aimed to understand the sentiments surrounding the use of Generative AI (GenAI) for digital cost management in UK construction businesses by investigating the ethical, technical, market entry, and operational requirements of GenAI in this context. Using a qualitative approach, a multiple case study research strategy was employed, involving micro, small, and large construction organisations. Sentiment analysis, a branch of natural language processing, was utilised in the analyses. Thus, insights into participants' emotional undertones and opinions were extracted. The study involved four case studies with nine participants from micro, small, large, and academic organisations. These participants provided insights into the ethical considerations, regulations, maintenance, and operations of a GenAI platform for digital cost management. The study found a need for a balanced approach to ethics, emphasising transparency and regulatory compliance. Market entry, adaptability, regulatory compliance, and affordability were identified as key factors influencing the adoption of GenAI tools. The technical operations theme revealed a positive sentiment towards the operational benefits of GenAI, such as improved efficiency and decision-making, but also emphasised the need for professional oversight. Operational challenges included workforce training and quality assurance. The implications of these findings are significant for the adoption of BIM and GenAI in the construction sector, especially among SMEs. The integration of GenAI with digital cost management has the potential to revolutionise construction operations. Hence offering enhanced efficiency and collaboration. Perceived complexity and initial investment are barriers that must be addressed before implementing GenAI for digital cost through BIM.

Keywords
BIM, Construction cost, Digital cost, Generative AI, Sentiment analysis.

1. Introduction
The construction industry's digital transformation has not enhanced cost management practices. Building Information Modelling (BIM) has offered a transformative approach to the design, construction, and management of built assets (Sepasgozar et al., 2022). BIM's integration with the lean construction concept has been identified as a significant factor in cost control for construction projects. Sepasgozar et al. (2022) emphasised the importance of this integration,

highlighting the potential for improved efficiency and reduced waste. 5D BIM, an extension of BIM, incorporates cost management into the modelling process, allowing for real-time cost estimation and monitoring throughout a project's lifecycle (Smith, 2014). Smith (2014) posits that the success of 5D BIM hinges on the ability of project cost management professionals to be integrally involved across all project phases. Furthermore, these professionals must be 5D literate, utilising electronic models to provide accurate and timely cost data. This has created an upskilling gap in the construction industry, especially in micro and small organisations.

Digital construction technologies have also been applied in New Zealand, the UK, the EU, Australia, the USA and other developing countries with a focus on improving productivity (Chowdhury et al., 2019). One of the key aspects of cost control identified by Chowdhury et al. (2019) is the management of safety on construction sites, which can lead to significant cost savings when effectively implemented. The interoperability of digital tools has become a focal point in monitoring and controlling construction projects (Duarte-Vidal et al., 2021). Duarte-Vidal et al. (2021) emphasise the importance of a collaborative environment and highlight the role of project management and cost control in ensuring successful project outcomes. Challenges persist, especially in digital collaboration within the South African construction industry (Emmanuel et al., 2018). Despite the potential benefits of digital construction technologies, barriers to adoption remain, particularly in developing nations (Ebekozien & Samsurijan, 2022). Integrating GenAI with BIM and cost management in construction projects offers a robust approach to digital cost management for all business scales and economies. As the construction industry evolves towards artificial intelligence (AI), adopting and effectively implementing these digital tools will be crucial in achieving optimal project outcomes, especially in construction cost management.

1.1 Objectives

The objectives of this study are:

- To understand the sentiments surrounding the application of GenAI for digital cost management in the UK construction businesses.
- To investigate the ethics, technical requirements, market entry and operational requirements of GenAI for digital cost management in the UK construction businesses.

2. Literature Review

The construction industry, particularly in cost management, has been experiencing challenges that often culminate in productivity issues and cost overruns. Alinaitwe et al. (2013) highlighted that public construction projects frequently need help with problems stemming from a lack of labour productivity standards and inadequate construction cost management. Similarly, Chigara et al. (2013) identified project cost overruns as a prevalent issue, attributing them to reduced labour productivity and challenges in implementing effective cost management strategies. Mahamid and Dmaidi (2013) noted that cost overrun as a significant problem in the construction sector, with factors such as inadequate site management, poor cost control, and delays between project phases exacerbating the issue. This sentiment is echoed by Amini et al. (2023), who identified poor productivity and inefficient cost control as primary contributors to cost overruns in Asian countries, using Iran as a case study. Gharaibeh (2014) investigated project cost control in major power projects using the Delphi method. The findings revealed that managing the scope, time, quality, cost, and productivity remains challenging, leading to cost overruns. Tejale et al. (2015) opined that the complexities surrounding construction project cost overruns are ascribed to labour shortages, low productivity levels, and a lack of effective cost-control mechanisms. Changali et al. (2015) emphasised that a staggering percentage of megaprojects experience cost overruns exceeding 30%. The authors argued for optimising designs to manage overall project costs effectively. Durdyev et al. (2012) conducted a case study in Turkey, highlighting that cost-related problems, particularly cost overruns, are pervasive in the construction of residential projects. Saidu and Shakantu (2016) explored the contributions of construction material waste to project cost overruns in Nigeria. Saidu and Shakantu (2016) revealed that cost overruns, often referred to as "budget overruns" or "cost increases", represent a significant portion of the production costs, underscoring the need for effective waste management in construction projects.

Construction cost management challenges are manifold, with productivity issues and cost overruns being central concerns. Addressing these challenges necessitates a holistic approach that encompasses effective cost management strategies, optimised project designs, and efficient waste management practices (Alinaitwe et al., 2013; Chigara et al., 2013; Gharaibeh, 2014; Amini et al., 2023; Changali et al., 2015; Durdyev et al., 2012; Saidu & Shakantu, 2016). There is a major digital technological gap in addressing the challenges, and recent advances through Generative AI through predictive analytics can support the alleviation of negative impacts.

2.1 Application of Generative AI in Construction

Generative Artificial Intelligence (GenAI) has emerged as a transformative force in the construction industry, offering innovative solutions and approaches to traditional challenges. This technology, which leverages algorithms to generate new data from existing datasets, has found applications in various facets of construction, from design to execution and monitoring.

One of the most promising applications of GenAI in construction is generative design. Generative design employs algorithms to explore various possibilities, and optimisation based on predefined criteria such as material efficiency, cost, and environmental impact. Alsakka et al. (2023) highlighted an approach based on generative design concepts combined with genetic algorithms, specifically targeting creating more economical and environmentally sustainable reinforced concrete structures. Such methodologies enhance the efficiency of construction processes and contribute to the broader goals of sustainability and environmental responsibility. Another intriguing application of GenAI in construction is its role in facilitating learning and knowledge dissemination. Ali et al. (2023) designed a learning workshop, "Dreaming with AI, "to familiarise students with generative machine learning algorithms. Such initiatives underscore the importance of equipping the next generation of construction professionals with the skills and knowledge to harness the potential of GenAI effectively. The concept of Digital Twins, which involves creating virtual replicas of physical entities, has also benefited from the integration of GenAI. Du et al. (2023) discussed the pivotal role of GenAI in bridging the physical and virtual worlds, emphasising the dynamic nature of the physical world and the consequent need for vast data transmission and processing capabilities.

Furthermore, applying GenAI extends to the intricate domain of construction scheduling. Hall et al. (2022) proposed a curriculum design for teaching generative construction scheduling, emphasising the "Tri-Constraint Method". Such educational endeavours aim to instil a deep understanding of generative methodologies in construction scheduling, ensuring that future professionals can leverage these tools for optimal project outcomes. However, the integration of GenAI in construction is not without challenges. The construction industry, with its complex interplay of variables, requires GenAI models that are both robust and adaptable. Yuan (2023) discussed the potential of an AI-augmented design era, highlighting the need for systems that seamlessly integrate AI and traditional construction processes. Generative Artificial Intelligence holds immense potential for revolutionising the construction industry. GenAI offers tools and approaches to address longstanding construction challenges, from design optimisation to enhanced learning methodologies and the creation of Digital Twins. GenAI's integration and effective utilisation will undoubtedly play a pivotal role in shaping its future trajectory as the industry evolves.

2.2 Technical approach to GenAI for digital cost management

Using pre-trained generative transformers like GPT, BERT, and T5 marks a significant advancement in natural language processing, particularly in Building Information Modeling (BIM). These models, trained on extensive datasets, are adept at generating and interpreting complex texts, which is crucial for BIM applications. The fine-tuning of these models for BIM-related tasks, such as interpreting project specifications and cost estimates, is a process of transfer learning, adapting the pre-existing knowledge of the model to specific BIM tasks (Radford et al., 2018; Devlin et al., 2018; Raffel et al., 2019). Custom sequence-to-sequence models, utilising architectures like encoder-decoder models, effectively convert informal project descriptions into formal BIM specifications. These models often employ Recurrent Neural Networks (RNNs), Long Short-Term Memory (LSTMs), or Gated Recurrent Units (GRUs) to handle sequential data, crucial for understanding the context and flow of information in construction project documents (Sutskever et al., 2014; Hochreiter & Schmidhuber, 1997).

Recurrent neural networks (RNNs), long- and short-term memories (LSTMs), and the gated recurrent units (GRUs) are specialised neural network architectures designed for processing sequential data. RNNs exhibit temporal dynamic behavior, capturing information from previous steps to influence the current output, but often suffer from vanishing and exploding gradient problems (Goodfellow et al., 2016). LSTMs, introduced by Hochreiter & Schmidhuber (1997), address these limitations with a more complex architecture that includes forget, input, and output gates. GRUs, a simpler variant of LSTMs, combine the forget and input gates into a single "update gate," providing similar performance with a more efficient architecture (Cho et al., 2014). Attention mechanisms and transformers, such as those introduced by Vaswani et al. (2017), enhance the model's ability to focus on relevant parts of the text, improving context understanding in BIM applications. This is particularly important for accurately interpreting project details and specifications. Effective training of AI models for BIM requires clean and structured datasets. Techniques like text normalization, tokenisation, and augmentation expand the dataset, ensuring that AI models are trained on data that closely resembles real-world BIM scenarios, thereby improving their accuracy and reliability (Bird et al., 2009).

Natural Language Understanding and Generation (NLU and NLG) are essential for extracting meaning and generating human-like text in BIM. NLU can extract project requirements from documents, while NLG can generate project reports or cost estimates. Techniques like dependency parsing, named entity recognition, and sentiment analysis are used for NLU, while narrative generation techniques are employed for NLG (Manning et al., 2014; Patil et al., 2024).

Integrating these AI models with existing 5D BIM tools, standards and frameworks is crucial for practical applications in predicting construction costs with more accuracy and reducing errors. This involves using BIM software APIs and custom middleware for seamless integration, ensuring that AI models relate to BIM software using API programming (Eastman et al., 2011; El-Diraby & Osman, 2017; Fielding, 2000). Most BIM applications use the common data environment (CDE) that would support collaborative working, and Infrastructure-as-a-service (IaaS) such as Google Cloud, Azure, and AWS can be used as hosting platforms for GenAI or Conversational AI applications for BIM-enabled digital cost management.

3. Methods

A multiple case study research strategy involving a micro, small and large organisation through a qualitative survey approach covering ethics, technical requirements, market entry and operations was applied. Sentiment analysis, a branch of natural language processing, has gained significant traction in qualitative research, particularly in analysing textual data (Egbelakin et al., 2023). This technique, which involves the computational identification and categorisation of opinions expressed in a piece of text, can provide valuable insights into the emotional undertones of qualitative data (Omotayo et al., 2023). Applying sentiment analysis in qualitative research, especially in case studies, offers a unique perspective to understanding human emotions and opinions in built environment research. A multiple case study approach in research is particularly relevant for sentiment analysis as it allows for an in-depth exploration of complex issues within their real-life context (Yin, 2014). Sentiment analysis can be instrumental in deciphering these complex layers of qualitative data within case studies. This will provide a structured and quantifiable way to interpret emotions and opinions. Moreno-Marcos et al. (2018) demonstrated how sentiment analysis algorithms can be used to understand the evolution of student emotions and opinions over time. This case study approach is particularly beneficial in educational settings where understanding student sentiment can improve course design and delivery. Pota et al. (2020) present a case study on Twitter sentiment analysis utilising a BERT-based pipeline. Pota et al. (2020) buttressed the effectiveness of advanced machine learning techniques in analysing sentiments on social media platforms. This case study is significant as it showcases the application of sentiment analysis in real-time, large-scale data, providing insights into public opinion and trends. Using sentiment analysis in qualitative research, particularly case studies offers a powerful tool for understanding complex emotional and opinionated data. The case study approach, focusing on detailed contextual analysis, complements sentiment analysis by providing a rich, real-world backdrop for the data. This combination allows researchers to uncover deeper insights and understandings that might be missed using traditional qualitative analysis methods alone. The sentiment analysis in this study was conducted using R studio after data was collected from five (5) cases involving nine (9) participants.

4. Data Collection

In this study, 5 case studies involving micro, small, large, and academic organisations participated in the qualitative study. Out of these five, the nine participants produced a focal outcome to theorise the ethical considerations, regulations, maintenance and operations of a GenAI platform for digital cost management. The results were presented descriptively. Table 1 presents various professionals from various backgrounds and their respective experiences in the construction and academic sectors. It outlines their specialisations, the scale of their organisations, the number of employees, and their years of experience, providing a comprehensive overview of their professional standing.

In Case A, QS1 represents a Quantity Surveyor with a specialisation in construction cost consultancy. This professional works in a small-scale organization, comprising 6 to 49 employees, and brings a substantial experience of over 26 years. This profile suggests a deep-rooted understanding of cost management in construction, likely accompanied by a strong network and a wealth of industry knowledge.

In Case B, two distinct profiles emerge. BIM1, a BIM Manager, and QS2, another Quantity Surveyor, both work in large-scale construction cost consultancy firms with over 250 employees. BIM1, with 21 to 25 years of experience, likely possesses advanced skills in Building Information Modeling, crucial for modern construction projects. QS2, with 11 to 15 years of experience, brings a relatively fresher perspective to the same field, possibly integrating newer technologies and methodologies in cost consultancy.

Case C introduces MD1, a Managing Director in construction and contracting. Operating in a micro-scale organisation with 1 to 5 employees, this individual has 11 to 15 years of experience. This scenario typically indicates a more hands-on approach to management and a closer relationship with both the business and its clients.

Table 1. Cases and participant profile

Case	Code	Professional background	Specialty	Scale	Employees	Years of Experience
A	QS1	Quantity Surveying	Construction cost consultancy	Small	6-49	26 years and above
B	BIM1	BIM Manager	Construction cost consultancy	Large	250 and above	21-25 years
B	QS2	Quantity Surveying	Construction cost consultancy;	Large	250 and above	11-15 years
C	MD1	Managing Director	Construction and contracting	Micro	1-5	11-15 years
D	MD2	Managing Director	Sustainability	Small	6-49	16-20 years
D	QS3	Quantity Surveying	Construction cost consultancy	Small	6-49	16-20 years
E	ACC1	Academic-Computer Sciences	AI/ML;	Large	250 and above	26 years and above
E	ACB1	Academic- Built Environment	Education	Large	250 and above	21-25 years
E	ACQ1	Academic-Quantity Surveying	Built Environment Education	Large	250 and above	16-20 years

Case D features two professionals: MD2, a Managing Director specialising in sustainability, and QS3, a Quantity Surveyor in construction cost consultancy. Both are situated in small organisations with 6 to 49 employees. With 16 to 20 years of experience each, they likely have a solid grasp of their respective fields, with MD2 focusing on the increasingly vital aspect of sustainability in construction.

Case E presents three academics with specialisations in Computer Sciences (ACC1), Built Environment (ACB1), and Quantity Surveying (ACQ1), all working in large academic institutions with over 250 employees. ACC1, with over 26 years of experience in AI/ML, brings a wealth of knowledge crucial for the technological advancement of construction practices. ACB1 and ACQ1, with 21 to 25 years and 16 to 20 years of experience, respectively, contribute to the education and development of future professionals in the built environment.

5. Results and Discussion

There are concerns about the ethical implications of using GenAI, such as the potential loss of in-house data, presenting AI-generated work as one's own, and the need for transparency. There is a general acceptance of the technical benefits of Generative AI, such as improved efficiency, automation, and interoperability. However, there is also a cautionary sentiment regarding the need for control and transparency in AI systems. Market entry suggestions include focusing on features like Carbon taxonomies and affordability considerations. The sentiment in Table 2 is mixed, emphasising the need for professional oversight and the potential of AI to streamline tasks but also caution regarding the unique nature of construction projects and the limitations of AI.

Table 2. Sentiment analysis

Case	Code	Attribute	Sentiment	Statement Summary
A	QS1	Technical	Acceptance	Improved cost and time efficiency with BIM-GAI.
A	QS1	Ethics	Concern	Potential loss of in-house cost data and competitive costing issues.
B	BIM1	Operations	Caution	Need for workforce training and validation of GenAI.
B	BIM1	Technical	Acceptance	Automation of systems and cross-platform validation.
B	BIM1	Market Entry	Suggestion	Focus on Carbon taxonomies and integration of 2D and 3D measures.
B	QS2	Ethics	Acceptance	Integrity of data is crucial, manageable with adherence to rules.
C	MD1	Operations	Caution	Generative AI as a tool, not a solution; importance of professional oversight.
C	MD1	Ethics	Concern	Ethical issues in presenting GenAI-generated work as one's own.
D	MD2	Technical	Acceptance	AI to streamline administrative tasks.
D	QS3	Ethics	Caution	Need for transparency and control over AI information sources.
E	ACC1	Market Entry	Neutral	Affordability as a key factor.
E	ACB1	Technical	Acceptance	Emphasis on interoperability and informed decision-making.
E	ACQ1	Operations	Acceptance	Focus on confidentiality, profitability, and competitive advantage.

Table 2 provides a structured overview of the sentiments and themes based on the provided statements. It's important to note that sentiment analysis can be subjective, and different interpretations may arise from the same data.

5.1 Concern around ethics and operations of GenAI for cost planning through BIM

QS1 raised concerns regarding ethics and the potential loss of in-house cost data and competitive costing issues, highlighting apprehensions about data security and competitive integrity in Quantity Surveying practices. The Managing Director (MD1) also expresses concern over ethical issues, particularly the misrepresentation of GenAI-generated work as one's own, highlighting the importance of professional integrity. QS3 points out the need for transparency and control over AI information sources, indicating a cautious stance towards the ethical use of AI in Quantity Surveying. BIM1 (a BIM Manager) and MD1 express caution regarding the operations of the Generative AI for cost planning. BIM1 emphasises the need for workforce training and validation of GenAI, indicating a careful approach to operational integration. MD1 views GenAI as a tool, not a solution, stressing the importance of professional oversight in its application. The concerns raised by the participants particularly QS1 can be addressed with adequate cybersecurity, firewall, encryptions and multifactor authentication. Operations of GenAI for BIM information sources and personal data would be protected through national and regional "responsible AI regulations and the General Data Protection Regulation (GDPR) Act 2018.

5.2 Suggestions and neutrality supporting further development and marketing

Suggestions was made for further application of GenAI in the construction industry sector by BIM1 who recommended focusing on carbon taxonomies and integrating 2D and 3D measures, indicating a proactive approach to market entry strategies in BIM. ACC1, an Academic in Computer Sciences, remains neutral but points out affordability as a key factor, indicating that cost considerations are crucial in the market entry of GenAI technologies. Carbon cost planning is an essential element of built asset procurement and management. Hence, the future of cost planning in construction may delve into other aspects of project cost management including lifecyle costing and net zero.

5.3 Acceptance: Ethics, operation, technical requirement and market entry

Six (6) respondents out of nine affirmed acceptance for GenAI for cost estimation. QS2, another Quantity Surveyor, accepts the ethical challenges but emphasises that data integrity can be managed with adherence to rules, suggesting a structured approach to ethical concerns. ACQ1, an Academic Quantity Surveyor, accepts the operational challenges but focuses on confidentiality, profitability, and competitive advantage, suggesting a positive outlook on the operational integration of GenAI. BIM1 confirmed acceptance of the automation of systems and cross-platform validation, indicating a positive view of the technical advancements GenAI brings to BIM management. MD2, another Managing Director, also accepted the role of AI in streamlining administrative tasks, acknowledging the efficiency gains in technical operations. ACB1, an Academic in the Built Environment, noted interoperability and informed decision-making, indicating a supportive stance towards the technical development of GenAI.

5.4. Improvements and implications of findings for construction companies.

Adopting BIM for digital cost management and GenAI in the construction sector, particularly among SMEs, is a new topic of significant interest. Integrating these technologies promises to revolutionise how SMEs operate, offering enhanced efficiency, accuracy, and collaboration. As embraced in the study by Wang et al. (2020), BIM is a foundational tool for digital construction. It provides a comprehensive digital representation of a facility's physical and functional characteristics, enabling stakeholders to visualise, simulate, and analyse various aspects of a construction project. However, the shift from traditional desktop-based BIM to more advanced web-based BIM platforms indicates the evolving nature of this technology. Generative AI, on the other hand, offers a paradigm shift in design and construction processes. As Braun et al. (2022) highlighted, SMEs have shown reluctance to adopt BIM and by extension, GenAI. This hesitancy can be attributed to various factors, including the perceived complexity of these technologies, the initial investment required, and the need for more skilled personnel. The potential benefits of integrating BIM and GenAI are undeniable. Rahimian et al. (2021) discussed the convergence of AI-based architectural design with BIM, resulting in a generative BIM (G-BIM) framework. Such a framework promises to streamline cost management and encourage a broader uptake of these technologies among SMEs. The application of GenAI in the construction sector extends beyond design. Sepasgozar et al. (2023) delve into the convergence technologies of BIM and Digital Twins, emphasising the revolutionary role of algorithmic and generative design. Fusing real-time data with AI enables a BIM model to evolve, adapt, and provide actionable insights throughout the construction lifecycle. Andersson and Eidenskog (2023) shed light on the slow uptake of BIM, suggesting that a deeper understanding of the barriers SMEs face is crucial. Factors such as more standardisation, interoperability issues, and continuous training and upskilling can deter SMEs from fully embracing BIM and GenAI.

Ashayeri et al. (2022) highlighted that the potential of BIM and generative design in optimising construction processes. However, the study also underscores the reticence among SMEs to exploit these technologies, often due to perceived complexities and the need for a clear return on investment. While integrating BIM and GenAI holds immense promise for the construction sector, especially for SMEs, challenges remain. Overcoming these barriers requires a concerted effort from industry stakeholders, policymakers, and academia. As the construction industry continues to evolve, the effective adoption and implementation of BIM and GenAI will be pivotal in ensuring that SMEs remain competitive and resilient in a rapidly changing landscape.

6. Conclusion

The exploration of GenAI and digital cost management through BIM in the construction industry, particularly among Small and Medium-sized Enterprises (SMEs), reveals an opportunity tempered by significant challenges. The integration of these technologies can transform SME productivity, operations, enhancing efficiency, accuracy, and collaboration. However, the adoption of these advanced tools is not without its hurdles. From an ethical standpoint, concerns about data security, proprietary information, and intellectual property rights are paramount. The apprehension about the potential loss of in-house cost data and competitive costing issues. Similarly, the ethical issues in presenting GenAI-generated work as one's highlighted the complexities surrounding authorship and intellectual property in the age of AI. These concerns necessitate a balanced approach to pursuing innovation alongside stringent ethical standards, emphasising transparency, control over AI information sources, and adherence to regulatory frameworks. In terms of market entry, adaptability and regulatory compliance are key considerations. The need for GenAI applications to be versatile and compliant with diverse environmental standards, especially in the EU, is critical. Economic barriers, such as affordability, also play a significant role in the widespread adoption of these technologies. Therefore, market entry strategies for GenAI tools must be tailored to meet the specific regulatory and economic landscapes of different regions. The technical operations theme reveals a positive sentiment towards the operational benefits of GenAI, emphasising improved cost and time efficiency, automation, and enhanced decision-making processes. However, there is a recognition that these technologies are tools, not solutions, and require professional oversight and thoughtful integration into existing workflows.

Consequently, the accuracy of costs produced through GenAI was draw some concerns. However, cost Generated through AI must be used as a predictive subject to professional judgement. Operational challenges include the need for workforce training and quality assurance in implementing GenAI. The focus on confidentiality, profitability, and competitive advantage indicates an understanding of the operational benefits of GenAI in enhancing business competitiveness. While integrating BIM for cost management and GenAI holds immense potential for the construction sector, especially for SMEs, overcoming barriers such as perceived complexity, initial investment, and the need for skilled personnel is crucial. The construction industry's future hinges on the effective adoption and implementation of these technologies, requiring a concerted effort from industry stakeholders, policymakers, and academia to ensure SMEs remain competitive and resilient.

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Temitope Omotayo is a Senior Lecturer in Quantity Surveying and a research lead of the Future of Systems, People and Project research lab of the School of Built Environment, Engineering and Computing, Leeds Beckett University, UK. Dr Omotayo is a Fellow of the Higher Education Academy (FHEA), a Member of the Association for Project Management (MAPM) and a Chartered Construction Management (MCIOB). His PhD in Construction and Project Management was channeled into over 75 research outputs in construction innovation, continuous cost improvement, sustainable construction, and systems dynamics. Temitope has research funding from the UKRI Innovate UK for the feasibility of BIM-enabled Generative AI Platform for Data-driven Incremental Productivity Enhancement of Construction Cost Management (BIM-GAI, IUK PROJECT NO: 10079600) worth £50,000 as the academic Principal Investigator. He has executed research grants funded by UKRI, Royal Academy of Engineering, Australian Bushfires, and Royal Institute of Chartered Surveyors (RICS) worth over £800,000. Dr Omotayo's recent book, "*Continuous Cost Improvement in Construction: Theory and Practice",* published by Taylor and Francis, is widely accepted as a contribution to continuous improvement and cost management research.

Jiamei Deng is an Artificial Intelligence (AI) and Control and Energy Professor from Leeds Beckett University (LBU). She is a PI for the UKRI EPSRC-funded project "Fault tolerant control for increased safety and security of nuclear power plants" (EP/R021961/1). She secured funding from Caterpillar Inc. as PI for "Neural network for engine out soot prediction". Where an AI algorithm was integrated into a vehicle management system, she was a Co-I for a TSB-funded project, "Vehicle energy recovery through an electric turbo assist system" (TP14/LCV/6/1/BG011L). Prof Deng will contribute her expertise in Generative AI, modelling and algorithm development, GAI and ML cloud computing.

Shohrab Hossain is a machine learning developer working on the UKRI Innovate UK research grant at the School of Built Environment, Engineering and Computing of Leeds Beckett University. Shohrab is working on the £50,000 BIM-enabled Generative AI Platform for Data-driven Incremental Productivity Enhancement of Construction Cost Management (BIM-GAI) project using his MSc expertise and background in Artificial Intelligence from the University of Huddersfield, UK.

Shakeel Khan is the director of the Property Box Group Limited, UK. Shakeel is the Project Manager of the Innovate UKRI BIM-GAI project. Shakeel has been a project manager in the construction industry since 2008. He has a vast relationship with global construction suppliers, manufacturers, subcontractors, and clients.

Milan Parmar joined the Property Box in 2018 to ensure our technologies are used efficiently, profitably, and securely. Evaluating and implementing new systems is one of his key roles in our business and improving our existing technology. Milan's background is in Quantity Surveying, with an MSc degree and a wealth of experience in digital construction. He has worked with RIB Software for 7+ years, where he built robust, scalable, data-driven technology solutions for clients worldwide.