Digital leadership enactment in the construction industry: Barriers undermining effective transformation

Abstract

Purpose – In the past decade, transforming key processes and activities towards a more digital nature has been the focus of most industries due to the associated advantages. Despite that, organisations in the construction sector are lagging the list of early adopters. The slow rate of a fundamental digital transformation is linked to the challenges facing an effective leadership. The purpose of this paper is, therefore, to shed light on the barriers to digital leadership enactment in the construction industry. Limited research has empirically analysed and discussed these barriers to explain the low transformation rate in the existing body of knowledge.

Design/methodology/approach – This paper empirically investigates the perspectives of construction industry professionals acquiring various roles in the industry. Overall, the study comprises the views of 38 participants, adopting a qualitative methodological approach to explore relative barriers and explain the slow digital transformation rate.

Findings – Findings are grouped into five themes: leadership characteristics, management and organisational issues, resource constraints, technological issues, and risk perceptions. The findings are helpful to business leaders, researchers, trainers, and educators to develop measures to encourage leaders in the industry to be at the forefront of digital transformation in their organisations.

Originality/value – Literature, however, is discreet in reflecting the challenges and barriers facing today's leadership in facilitating digital transformation among construction stakeholders. This paper provides insights into the variables that may be undermining wider digital adoption across the construction sector's organisations.

Keywords leadership; digital leadership; digital transformation; digital innovation

Paper type Research paper

Introduction

Globally, the construction industry is categorised as a complex yet significant sector. Within four years, the global construction market recorded a growth rate of 2.8% per year, representing a valuation of 10 trillion dollars (Büchner, 2019). Construction is one of the prime sectors of the UK economy, cited to employ over 2.4 million, comprising 10% of the total employment, and valued at over £100bn in worth (Stiles et al., 2021). Digitalisation emerges as a fundamental need, offering critical advantages to support complex sectors. For instance, digital transformation in healthcare, banking, manufacturing and finance is evidenced with a plethora of benefits (Low and Bu, 2022). However, this transformation is occurring at a much slower pace in construction (Opoku et al., 2021). Areas where digitalisation is advancely excelling in the construction context can be seen through the better use of Artificial Intelligence (Regona et al., 2022), Blockchain Technology (Pellegrini et al., 2020), and Augmented Reality (Bellalouna, 2021).The existing body of knowledge argues the fragmented nature of the construction sector, which is undermining a more facilitated digital transformation compared to other sectors (Bademosi and Issa, 2021). Digitalisation expands beyond simple day-to-day tasks to the introduction of more advanced technologies like robotics and automated tasks (Manzoor et al., 2021). Such evolvement is enhancing competence through minimising the margin of task error by the ability to learn and identify patterns (Huang et al., 2021). Ernstsen (2021) discusses the need to focus on the non-technical aspects when investigating digital manifestation in construction organisations. This is evidenced by Nikmehr (2021), who report the critical performance, economic, and sustainability enhancements associated with digital transformation.

Business leaders and managers hold crucial positions in influencing their organisations to facilitate digital transformation. Therefore, leaders in the construction industry must be seen at the forefront of their organisations' endeavours to digitalise. Recent research documented the influence of leadership in driving innovation in organisations. However, a bridge is deemed necessary to link both practice and academia in reflecting multiple perspectives. Such an approach is argued to unravel the barriers as perceived from an internal perspective rather than what literature identifies externally at leadership levels. Limited studies are dedicated to the role of leadership in driving digital innovation in the construction industry (Zulu and Khosrowshahi, 2021), and this paper acts as a critical contribution to this research gap. Hence, this study explores factors that impact digital leadership enactment in the construction industry.

Studies covering digital leadership are rich in other industries but are limited in the construction industry. Focus of the research body is mainly on education (Hairon et al., 2015), healthcare (Greenfield, 2007), and governmental institutions (Mu et al., 2022). However, studies focusing on digital and leadership enactment in the construction industry are very limited. Thus, there is a need to address this research gap and drive more research in a direction deemed critical to help in explaining the slow digital transformation rate in the construction industry and offer the necessary evidence to aid informed decisions towards addressing the barriers facing an effective leadership. The identified barriers to digital leadership enactment are grouped under five themes: leadership characteristics, management and organisational factors, resource constraints, technology, and risk perceptions.

Digital Leadership

Leadership is pitched by literature as an innovation enabler due to the role that innovation leaders and champions play in accelerating digitalisation (Ernstsen et al., 2021). However, digital leadership is shaped by how leaders react to digitalisation, as different strategies yield different outcomes (Marenco and Seidl, 2021). There is an increasing need to study the barriers of achieving adequate leadership among the key stakeholders in the construction industry. Literature is generous when identifying these challenges at multiple levels, capturing issues like unwillingness to share information among peers (Lu et al., 2021), digital security concerns (Manzoor et al., 2021), and lack of relative skills (Nikmehr et al., 2021). However, the existing body of knowledge lacks an adequate understanding of other perspectives that could support research efforts to detail the challenges facing today's digital leaders and by that directing them towards the critical pressure points for an effective transformation.

Recent studies acknowledge the emerging need to study samples from within organisations that would better detail the reasons behind digital resistance among professionals (Bademosi and Issa, 2021). An intent investigation of the barriers is believed to be necessary to help understand and explain the current digital condition (Nikmehr et al., 2021). Such investigation is deemed critical beyond the technical challenges to focus on multiple non-technical aspects undermining such a fundamental transformation (Branca et al., 2020). Similiarly, Zulu and Khosrowshahi (2021) opined a research gap where knowledge on what encompass an effective digital leadership is lagging. Based on the above, this paper responds to the recent body of knowledge's call to maximise contribution to digital transformation by unveiling knowledge through an empirical reflection of an understudied perspective.

The term "digitisation" refers to using digital technologies to connect people, devices and data to improve and transform business processes (Willemse et al., 2020). Much misunderstanding, however, exists around the term “digital transformation” (Bican and Brem, 2020). Initially, the term appears to focus on an ultimate shift in the way organisations think, work, and manage digital trends responses in competitive markets (Kane et al., 2017). However, conceptualising digitisation should be regarded as an ongoing process for growth and development that may help managers during digital adolescence. Furthermore, as the new era for enterprise information technology (IT), IT and business innovation are more integrated and corporate, shifting towards digitalisation from a legacy perspective, whice emphasises the need for digital leadership (Ernstsen et al., 2021). Such leadership is, therefore, at the forefront of this investigation due to its influence at an internal magnitude and on organisations' business models, shaping how firms approach their relative markets (Veile et al., 2022).

An increased level of engagement from those in transformation-specific roles and senior leaders has been pointed out as a critical determinant for success (Benitez et al., 2022). Based on previous studies, there is a clear requirement for what constitutes effective digital leadership, what capabilities are needed and how the fundamentals of digital leadership can be built upon and strengthened (Shojaei et al., 2022). For example, Accenture indicates that the characteristics required for effective digital leadership are dynamic, flexible, and well-regarded towards the customer, all of which are non-technical aspects (Bayley et al., 2017). This triggers the argument that digitalisation is less about technology and more about transforming individuals. Similarly, Kane and Serb (2019; 2020) argue that digital transformation is about managing the transition rather than influencing technicalities; this includes effective

leadership, acquisition of appropriate skills for leaders, managers and employees to buy in and integrate the organisation's systems with new digital technologies.

A review of past studies can be argued to adopt a technology-oriented approach when investigating digital transformation (Zulu et al., 2022). Research, however, is limited when dealing with digital leadership within the construction industry in the UK. Therefore, the purpose of this study is to explore factors that impact digital leadership enactment in the construction industry, capturing the perspective of professional postgraduates as future leaders and approaching the research question:

RQ. What are the challenges and barriers facing today's leaders in their quest to enhance digital uptake within the UK construction sector?

Research Methodology

Data is collected using a qualitative questionnaire survey, where respondents are asked open-ended questions and are required to respond with free textual data. This approach captured participants' experiences and perspectives without having any leading influence on their inputs. Agustianingsih and Mahmudi (2019) suggest that this approach can be used to identify the understanding of concepts, reasoning, and misconceptions and encourage communication. This suited the present study, which sought employee perceptions of their leaders' attitudes toward digital innovation to avoid self-reporting bias if leaders were asked to evaluate themselves by reflecting their position as future leaders. A convenience sampling approach is adopted to identify suitable participants. The study involves construction industry professionals with well-regard to convenience sampling, an approach in qualitative research where participants are conveniently available concerning access, location, time and willingness (Whitehead and Lopez, 2016). Such a sample type has been described as

the ambassoders of digitalisation in construction organisations (Jacobsson and Linderoth, 2021).

The data is analysed using the inductive thematic analysis procedure described by Braun (2022) as a practical analysis approach aligning with this paper's research question. There are two primary styles in thematic analysis to identify themes from qualitative data. To distinguish between the two, Nowell (2017) characterises an inductive approach as one where the coding of the data is data-driven and does not try to fit it into a pre-existing coding frame, while a deductive/theoretical approach as one which is driven by the researcher's theoretical or analytic interest in the area. An inductive approach used in this study without considering the typical categorisation of leadership in general literature; instead, authors provide a characterisation of leadership based on first-hand experiences of employees. The analysis approach also followed Braun's (2021) six phases of analysis: familiarising oneself with the data, generating initial codes; searching for themes; reviewing themes, defining and naming themes; and reporting.

Findings

Sample Demography

In order to gain a perspective from a practice perspective, participants are required to be working in a construction organisation at the time of their participation in this study. This sample is deemed critical to reflect the digital barriers facing leaders, acting as an opinion that bridges a leadership stance from an employee perspective. We visualise information about the participants, such as gender percentage (Figure 1), participants' role distribution (Figure 2), and the company's annual turnover (Figure 3). Table 1 below summarises the characteristics of the sample; overall, most participants

worked in quantity surveying and commercial management, and participants represent various professional roles. Almost 80% are classified as professionals, first-level managers and middle managers, with less than 25% represented by trainee level participants. This is also reflected in the participants' experience in the construction industry. Over three-quarters of participants have at least three years of experience in the construction industry, and a quarter of themhave less than three years of experience. Authors acknowledge that the construction industry is not homogenous, and our analysis approach did examine the sample at an aggregate level so that we did not attribute the commonness of some typologies to specific company scales/size. Therefore, the representation of smaller and less represented populations may be argued to be a merit. Thus, the data shows that the 38 participants are of a suitable profile and therefore are considered to inform the study of their perceptions of digital leadership in the construction industry. However, further analysis of data did not consider the respondents' profiles. Overall, previous seminal works argue the lack of a benchmark of the best suited number of participants in qualitative investigations (Patton, 1982). However, an indicator of qualitative credibility is through data saturation (O'Reilly and Parker, 2013), and thirty-eight participants are considered sufficient in reaching such saturation (Galvin, 2015).

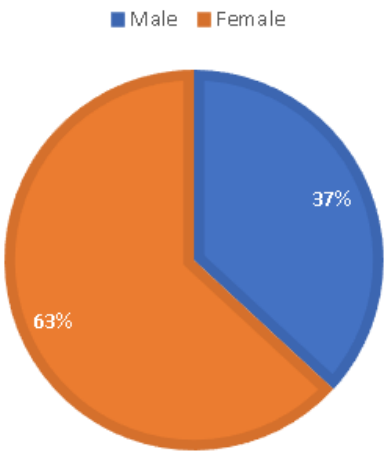

Figure 1: Gender of the participants

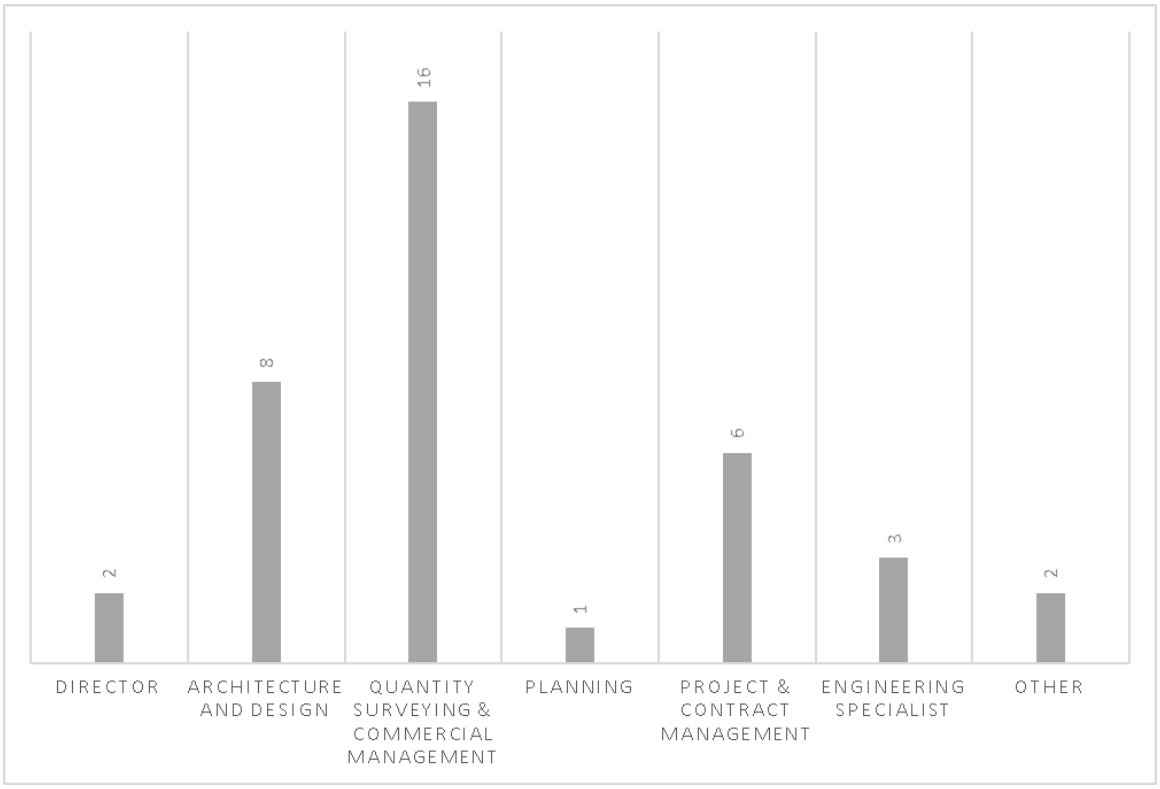

Figure 2: Role distribution

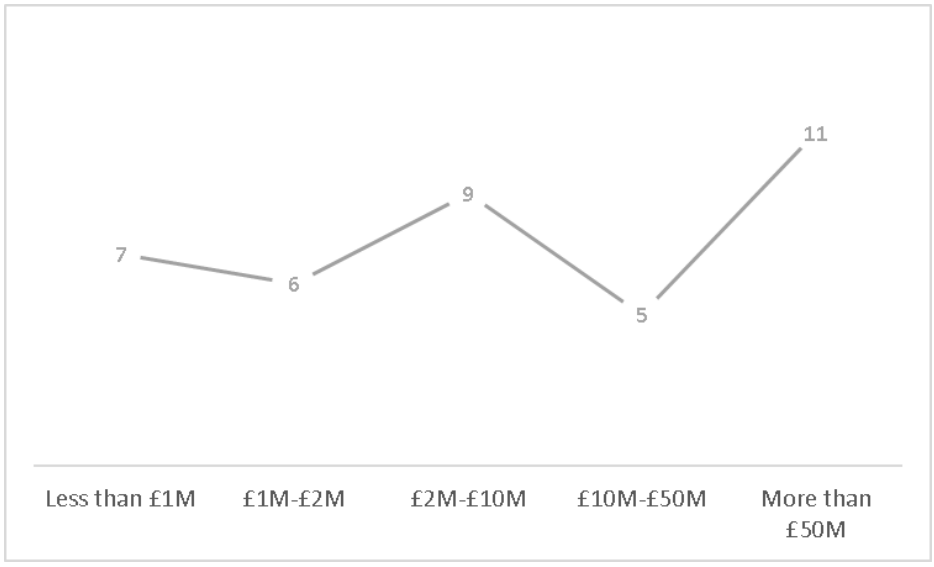

Figure 3: Company's Annual Turnover (Millions)

Table 1: Overall sample characteristics

Characteristic	Frequency	Percent
Gender		
Male	14	37%
Female	24	63%
	38	**100%**
Present Job Role		
Director	2	5%
Architecture and Design	8	21%
Quantity Surveying & Commercial Management	16	42%
Planning	1	3%
Project & Contract Management	6	16%
Engineering specialist	3	8%
Other	2	5%
	38	**100%**
Position in organisation Hierarchy		
Middle Managers	2	5%
First Level Managers	5	13%
Professionals	23	61%
Entry Level/Trainees	8	21%
	38	**100%**
Years in employment with company		
Less than 1 year	8	21%
1-2 years	15	39%
3-5 years	7	18%
6-10 years	5	13%
Over 10 years	3	8%
	38	**100%**

Characteristic	Frequency	Percent
Years working in the construction industry		
Less than 1 year	4	11%
1-2 years	5	13%
3-5 years	10	26%
6-10 years	5	13%
Over 10 years	14	37%
	38	**100%**
Number of Employees in Company		
Less than 10	6	16%
10-50	6	16%
50-250	9	24%
250-500	3	8%
Over 500	14	37%
	38	**100%**
Company's Annual Turnover (Millions)		
Less than £1M	7	18%
£1M-£2M	6	16%
£2M-£10M	9	24%
£10M-£50M	5	13%
More than £50M	11	29%
	38	**100%**

Analysis

The study aims to determine the barriers and enablers to effective digital leadership in the construction industry from an employee's perspective. The analysed free-text responses using an inductive thematic analysis approach, where themes are not influenced by authors and are naturally derived from repetitive patterns (Nowell et al., 2017). Braun (2021) six phases of thematic analysis are followed in analysing the data and has led to identifying five themes. Phases are initiated by making sense of the qualitative data, formation of themes based on patterns, coding of each determinant

under each theme, and finally relating themes to past research efforts and reporting. These include leadership issues, management and organisational issues, technological issues, resource constraints and risk perceptions. These themes provide insight into participants' perceptions of factors that influence leaders in enacting their role of driving digital innovation in their organisations. The five themes are presented in Figure 4.

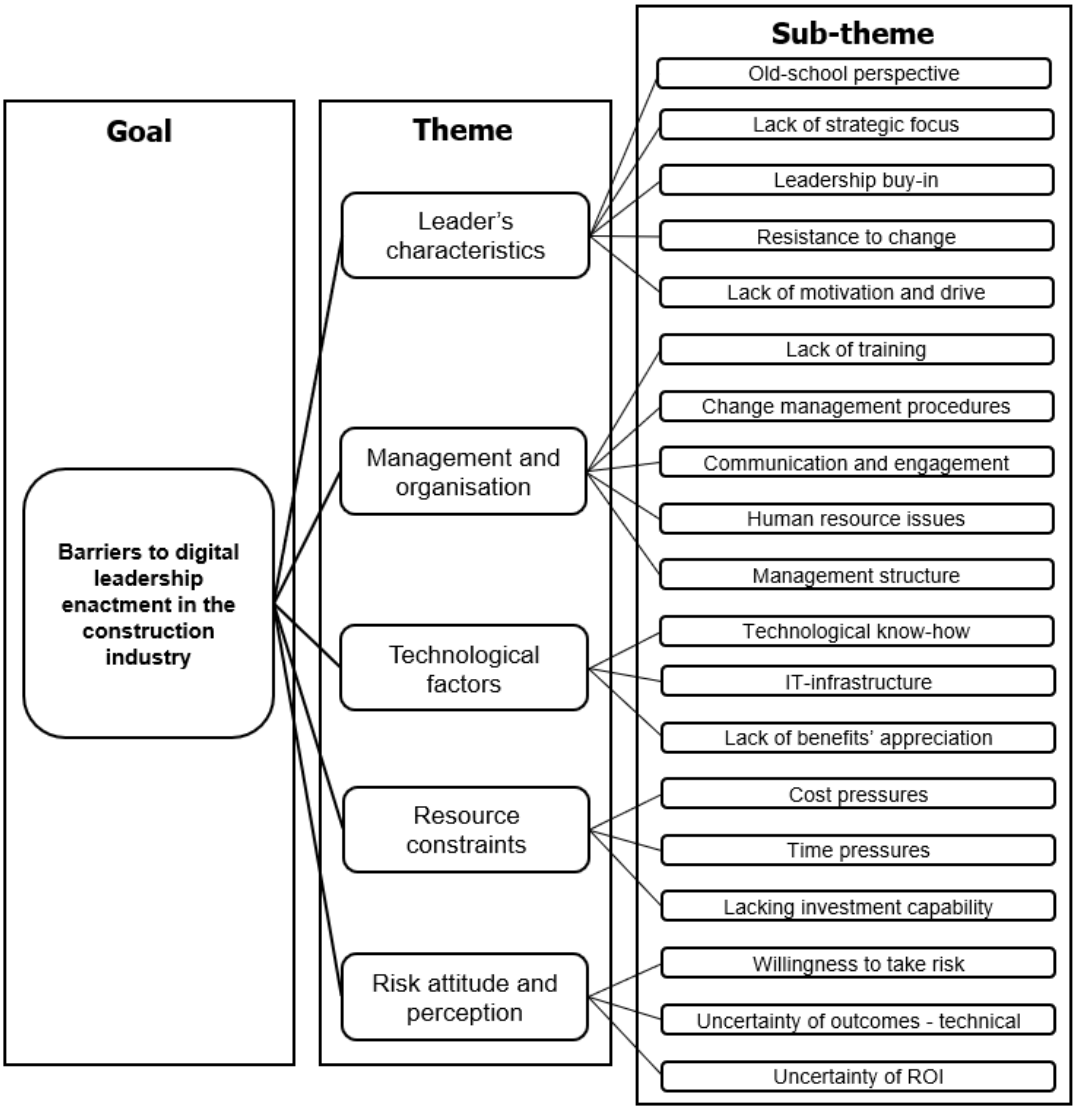

Figure 4: Hierarchical framework of the five themes

Theme 1: Leadership characteristics

Upon the empirical investigation, the first emerging theme is the characteristics of digital leaders as influencers in the adequate creation of a digital-friendly environment. The analysis unravelled sub-themes such as lack of motivation and drive, lack of training; resistance to change and traditional mindsets; lack of strategic focus; and lack of leadership buy-in.

Participants reflect on the lack of drive and motivation by their organisational leaders. P15 indicates that *"The main barrier in my view is the lack of motivation from the company leaders to push innovation and invest the time needed to make it a success"* [P15], while P18 input of leadership in their organisation: "*There is no drive from the company leadership towards digital transformation"* [P18]. Another participant reflects the need to modernise and the need for conscious leadership to drive innovation: "*Not with that momentum, which should be based on conscious leadership, as it should be realised that some of the technology currently used are from past, and more effective solutions must be sought to keep pace with the huge technological developments*" [P32].

Some participants reflect on leaders' resistance to change: "*Directors being resistant to change [P22]; very resistant [P20]*. Studies on resistance to change tend to focus on employees' resistance to change. However, the context here is that leaders can also resist change even when employees are eager to change organisational practices and procedures. The traditional mindset is also a barrier to digital leadership enactment. For example, P24 commented: *"Traditional mindset takes time to adapt to changing circumstances",* while P14 stated. (there is) *"Old school management that sits at the top of the organisation".* The traditional mindset among leaders is not always universal across organisations. In some organisations with multiple departments or

sites, this adoption of technology company-wide may be an issue. In some organisations, one department is eager and driving digital innovation, while in other departments, it is not the case. For example, P5 stated: *'Overall positive from leadership within the office. Within other offices, it appears that there is less of a drive to push the software'*.

Top management support is essential for successful change initiatives. Some of the responses reflected the lack of leadership buy-in. For instance, a participant indicated: "*Not very effective; there is a lack of buy-in from management"* [P21]. P3 indicated, *"Our leaders have to be show more conviction in their leadership, there does not seem to be any drive-in digital transformation"*. Others indicate a lack of drive from the top and that digital transformation initiatives are driven by staff. Moreover, participants note the lack of strategic focus to drive innovation. It was common to see descriptions of leaders who are focused on the business as usual practices with little consideration of digital innovation. For instance, P29 indicates: *"Focus on profit generation and limited capacity to concentrate on the future"*. Others such as P7, P6 and P12 also reflect on management's focus on current achievement rather than the long-term investment.

Theme 2: Management and organisational factors

This theme reflected management issues and organisational design influences on the leadership's ability or disposition to drive digital innovation in their organisations. Four key barriers are identified. These include lack of training, change management procedures, communication and engagement, human resource issues, and management structure.

Participants reflect the lack of training for both leaders and their teams to drive innovation. For instance, P21 indicates "*Lack of training for the management and the rest of the firm*", while P26 reflectes on the need for training: "*Need more training and more proactive to go with the trend*". Training can be an essential factor to help leaders' transition from a traditional mindset to a new mindset fit for the digital age (Serb (Tanislav) and Anghel-Blidaru, 2020). Effective change management processes were also noted as a barrier to digital leadership. For example, P4 is categorical in identifying this as a barrier to digital leadership: One participant noted *"lack of effective change management*" [P4].

A related concern is the inadequate or poor information flow within organisations. Some of the participants' responses show that management appear not to have put in place a coordinated effort to digital innovation, as evidenced by poor communication. For example, one participant comments that *'… communication to people in non-leadership roles is poor. These people often do not find out about what is being introduced until it has happened, there are often many teething problems.* [P16] while another: *'I find it is enforced with lack of understanding or direction leading to impatience and scepticism'*—[P25]. Internal communication is known to be a critical factor in driving organisational innovation (Sklyar and Sokolova, 2019). In particular, the quality of the information exchange can reduce the amount of uncertainty, improve the organisational climate, and surround the project with better cross-functional cooperation in organisations (Lievens et al., 1999).

The organisation structure is also identified as a potential barrier to leadership enactment. For example, P3 indicates that *"The size of the organisation, budgetary constraints and too big a gap between the main people at the top and the day to day*

team leaders". In some cases, the pace of digital technology adoption differs between departments within the same organisation. From an entire organisation's perspective, leaders fail to have a coherent approach to digital innovation. For instance,

> *Within my own organisation, there is a drive from some senior managers, but on the whole, the digital transformation within the organisation is currently limited" [P15].*

Theme 3: Technological factors

Technological barriers related to three key issues, including leaders' understanding of technology know-how, organisational IT infrastructure and leaders' perception of the value of technology. The leaders' lack of understanding of the workings of digital technologies (technology know-how) is identified as a barrier to their ability to drive digital innovation in their organisations. For instance, P17 indicated that *"being of the older generation and does not really understand how the technology works" [P17].* The lack of understanding of how technology works is also seen to give leaders unrealistic expectations: *"Lack of their own understanding of the software giving them unrealistic expectations either in terms of deliverables or timeline" [P25].* Others pointed to the leader's lack of understanding of the value of digital technology. Some participants note the need for an IT infrastructure to drive digital innovation. For example, P13 notes that *"We do not have an IT department. Our Partners are Quantity Surveyors/Project Managers and, therefore, are not always aware of the latest digital trend in the industry"*. While P27 notes: *"Reasonably good, but we have struggled to move away from the use of xxx to xxx. Generally, most systems are online, run well the vast majority of the time, they did outsource IT support to an external company which has not gone too well".*

Theme 4: Resource constraints

This theme reflects the impact of financial and time pressures on the leaders' motivation to drive digital adoption. A related issue to cost pressures is the lack of investment capabilities within the organisations. The cost of the technologies is seen to be a factor influencing leaders to drive digital innovation. For example, P6 indicated: *Lack of understanding and the costs associated with a digital transformation [P6].* Others reflectthe limited investment capability of their organisations as a factor influencing leaders' efforts to digitalise their organisations. *"Financial constraints" [P34] and "Lack of capacity to invest" [P12]* are examples of sentiments provided by the participants in reflection of factors that influence leaders' drive toward digital innovation. Another resource constraint factor is related to time pressures. P5 stated, *"Not enough time to dedicate to learning" [P5],* while P12 indicated *"Lack of time to focus on digital strategy" [P12].*

Theme 5: Risk perceptions and attitudes

The risk perceptions and attitudes of leaders also seem to play a part in influencing their ability to lead organisations to transform digitally. The leaders' attitudes towards risk are recognised as a barrier to leaders' drive for digital transformation. Sentiments such as *"(un)willingness to take risks" [P27] and "Risk aversion and unwillingness to experiment" [P4]* are reflecting leaders' risk attitude toward digital innovation. Risk perceptions are also reflected in leaders' perceptions of uncertainty in outputs from digital technologies considered for adoption. For instance, P32 indicated: *"The uncertainty in the form of the output that may result from the use of this technology".* Participants also reflect on the uncertainties in return on investment (RoI). Below is an example comment from a participant:

"The main barrier in my view is the lack of motivation from the company leaders to push innovation and invest the time needed to make it a success. Understandably leaders need to see that any investment is commercially viable and until this is confirmed there will be a barrier to any development" [P15]

Discussion

The use of the qualitative questionnaire enables us to investigate the perceived barriers to leadership enactment required for digital transformation in the construction industry, an issue that has remained unexplored. The main findings are that the barriers to digital leadership enactment can be grouped into the five themes: leadership issues, management and organisational issues, technological issues, resource constraints and risk perceptions. Figure 5 represents the critical barriers to digital leadership based on the findings presented above.

Figure 5: Barriers to digital leadership enactment

While we did not find a study that focuses on barriers to digital leadership enactment in the construction industry, some similarities between our findings and issues identified in the literature on barriers to digital technology adoption. However, in previous studies, the unit of analysis is mainly at an organisational level and not at the leadership level. We did not focus on individual leadership but a collective from a distributed leadership context. Distributed leadership, rather than focusing on the work of individual leaders, explores the interactions between a layer of leadership functions. Harris (2009) points out that distributed leadership recognises multiple leaders and that leadership activity is widely shared within and between organisations. As such, distributed leadership focuses on the interactions rather than the actions of those in formal and informal leadership roles (Leithwood et al., 2007). Inputs on this matter, it may be beneficial to relate to other sectors when discussing motivation and drivers. For example, Martin (2020) studies the motivation aspect of using digital technologies to promote education; the study concluded that the benefits of learning are the main factor that triggered motivation. Similarly, Hsu (2019) acknowledges the role of top management in aiding their organisation's robustness to handle external influences through supporting innovative internal practices when investigating service innovation processes. Sanchez-Riofrio (2021) emphasises the criticality of organisations to better capture evolving trends; this is being argued as a critical approach to handling the influence of innovations like digitalisation.

Leadership Characteristics

The characteristics of leaders are acknowledged in the literature as a vital element for innovation in organisations. See, for example, Cortellazzo (2019), who concludes that leaders are key actors in developing a digital culture within an organisation. Studies

such as Oberer (2018) and Mkheimer (2018) show the impact of leadership characteristics on organisational processes and outcomes. The findings also identify the role of management and organisational factors that impact the effectiveness of digital leadership enactment. The issues under this theme can be related to McKinsey's 7S model, which identifies seven organisational elements, including strategy, structure, systems, style, skills, staff and superordinate goals, where change can be evaluated. The idea is that organisational effectiveness stems from the interaction of many factors, some of which may not always be obvious. Such factors could critically emerge from within the organisations and are being described by researchers as the leadership qualities of top management Yitmen (2011). Waterman (1980) acknowledges these factors beyond mere consideration of structure and strategy. The McKinsey 7S model focuses on analysing organisational areas where change is expected to be made, while the other four models provide steps or processes required in managing organisational change. The McKinsey 7S model, therefore, lends itself well to be used as a basis for evaluating changes in the organisation as such was adopted for this study (see Figure 6).

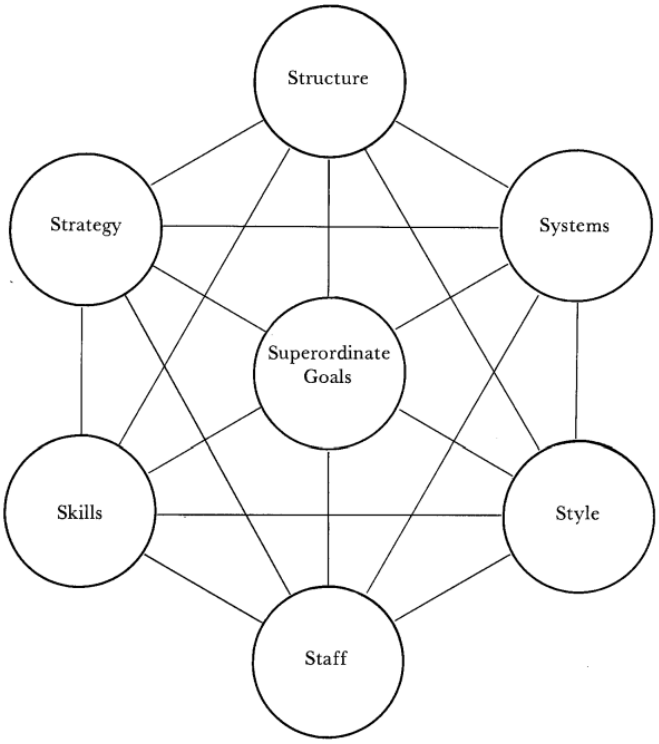

Figure 6: McKinsey 7S model extracted from (Waterman et al., 1980)

Management and organisational barriers

Limited research exists to identify the direct linkage between digitalisation and an organisation's performance at an organisational level. This may deter leadership decisions from providing unconditional support to drive digitalisation and focusing on more traditional and proven performance indicators (Sanchez-Riofrio et al., 2021). This aligns with Yitmen (2011) contribution concerning the organisation's behaviour and drive, detailing the influence of the effective management of intellectual assets to enrich the organisation’s competitive advantage in the market. Therefore, competitive advantage is a critical driver and enabler for digitisation adoption; this aligns with previous case studies for which a transformation was not possible, leading to organisational failure. For instance, Rothmann (2014) studies the newspaper industry and the influence on their organisation due to the delay in embracing digital technologies. Focusing on such details and learning from case studies and previous

scenarios may provide new prospects for organisations rather than such transformation efforts being bounded by individual incentives (Henriette et al., 2016).

Technological factors

Technological barriers have shown to impact digital technology adoption. For example, Saka (2020) identified a lack of IT knowledge and dependencies on other technologies as barriers to BIM adoption. Davidsson (2016) details such barriers as scalability and information security issues. There is a generalisation in the technological barriers when investigating the broader influence of digital leadership. Due to the nature of digital technologies, technological barriers are linked to the characteristics of the adopters themselves in dealing with the technologies rather than the complexity of the transformation itself. Research, therefore, has been urging decision-makers to shift attention toward the pressure points such as the upskilling and well-regarded focus on training and education to overcome the technological challenges of digitalisation (Viswanathan and Telukdarie, 2021). Sorko (2016) argues that an organisation has to follow a readiness assessment mindset to have an adequate understanding of their resource and skill maturity levels regarding digitalisation. Such an evaluation and understanding their position would then enable the identification of the efforts needed for a successful transformation.

Resource constraints

Managing resources is not always related to a controllable event; as these are subject to the availability of funds and the investment capability of the organisation as well as the ability to permit the time associated with a learning curve. Findings suggest that resource constraints within an organisation are influencing leaders' motivation for digital adoption. Aligning with prior works who linked the lack of investment capability

as a barrier limiting wider digitalisation in construction firms (Brancati, 2015; Diaz Lopez et al., 2019). Cost is therefore a key enabler of digitalisation from a leadership lens (Aghimien et al., 2022). Moreover, another resource constraint revealed by the findings of this paper is time. It is logical to state that time in construction is of essence and it can influence decisions if perceived to conflict with other priorities (García de Soto et al., 2022). Time, in this context, is that linked with the period needed for stakeholders to pass the learning curve associated with digitalisation. Our findings, therefore, align with the findings of Gledson and Greenwood (2017), on the influence of the period of learning on the adoption-decision.

Risk attitudes and perceptions

A leader's risk perception can be a crucial determinant of organisational success. For example, MacCrimmon (1990), in their study of 500 executives, find that the most successful executives are the most significant risk-takers and that the most mature executives are the most risk-averse. Risk perceptions also have an impact on technology adoption. For example, Li (2020) demonstrates that risk perception directly affects users' attitudes and intentions to use Alipay- a mobile payment platform. Their results suggest that when users perceive the risks of using Alipay as higher, they hold a negative attitude about using Alipay and are less likely to use it. Therefore, it would be the cases that risk attitudes, the uncertainty of outcome and the uncertainty of return on investment will play a part in leaders' risk behaviour and, therefore, impact their ability to drive digital innovation in their organisations.

Conclusion and Recommendations

The study aimed to explore factors that impact digital leadership enactment in the construction industry. The industry is characteristically slow at adopting technologies,

yet the role of business leaders is considered vital to accelerating digital transformation. Many studies on digital leadership exist in other research fields, but there is a lack of research focused on the construction industry. Therefore, this study is timely in impact and can be considered a clear call to researchers studying the adoption of innovation to focus efforts on the non-technical aspects associated with an effective digital transformation through digital leadership. The literature has argued that unless we know what hinders digital leadership enactment, the initiatives to encourage business leaders to lead the way may be limited. Therefore, this paper identifies the barriers to digital leadership enactment from a critical perspective within organisations. The findings suggest that the barriers to digital leadership enactment can be grouped under five themes: leadership characteristics, management and organisational issues, technological factors, resources constraints, and risk perceptions. A variety of exciting arguments emerged from the analysis of the results, one of which aids theories in the perception that even early adopters within the organisation may not be enough in the absence of digital leadership that would undermine an effective transformation. Therefore, practitioners, leaders, and researchers can target these areas in shaping their strategies to accelerate digital transformation and innovation adoption.

The study had two key limitations, which may impact the interpretation of the results. First, participants were selected from a continent sample group composed of part-time postgraduate students working in the construction industry. While they had the experience to respond to the questionnaire, the sample frame may be considered homogenous and, therefore, may not represent views of the construction industry population in the UK. Second, qualitative questionnaires where participants write in responses may result in less rich data than other qualitative methods such as

interviews. However, the methodology enabled the researchers to obtain data from a larger sample size than with interviews. Considering that this was an exploratory study, there are opportunities for further research on barriers to digital leadership. The results from this study can be used to design a quantitative study to capture views from large sample size and test the significance of the influence of the different variables identified. Separate studies could also focus on each construct to enable an in-depth analysis of barriers to digital leadership enactment in the construction industry.

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