DIGITAL INNOVATION AND INTRA-ORGANISATIONAL CHANGE: A CHALLENGE FOR THE CONSTRUCTION INDUSTRY

Studies have examined the benefits of broader use of digitalisation on the construction industry. However, there has been limited empirical explorations of the challenges of intra-organisational change due to digitalisation. A review of general change management literature shows that studies on organisation change have broadly focused on the reasons and the impact of the organisational change. The study is based on a qualitative methodology using semi-structured interviews with industry leaders and uses the McKinsey 7S model as a theoretical lens to examine digitalisation-led intra-organisational change. Qualitative data from seven participants has been analysed both thematically and deductively, leading to the identification of the recurring patterns that align with the adopted theoretical framework. Findings include key challenges in achieving a common meaning of relative values, organisational structuring, leaders' strategies and style, and the readiness of employees in terms of skills and overall acceptability to change. The provides further insights into the challenges associated with digitalisation at an organisational level, offering coherence on these challenges and enabling more informed decisions that are vital for an effective transformation.

Keywords: construction industry; digitalisation; digital innovation; intra-organisational change; organisational theory

INTRODUCTION

The shift towards digitalisation has driven industries to a fundamental change. However, the construction sector, as is often the case, is among the last to embrace innovations, and digitalisation is not an exception. Nonetheless, the benefits of using digitalisation have led to a 'digital era' (Shah, 2022), and in turn, the changing digital environment is forcing construction organisations to apply unprecedented changes as an unavoidable need to cope with the transformation (Zulu and Khosrowshahi, 2021). Generally, challenges undermining broader technological change have been linked to people, organisations, and strategies (Li et al., 2019). It has been contended that multiple changes at an organisational level are critical for achieving alignment with an external changing environment (By, 2005). Such organisational change has been described as 'multifaceted', due to requiring new, and most often complex ways of thinking (Thakhathi et al., 2019). The emergence of digitalisation, hence, demands an increasing need for construction organisations to alter their conventional processes and establish a more ready and reinforced environment that can drive change. Hence, introducing digitalisation to the construction narrative demands a level of adaptation among organisations in relation to their internal processes to effectively leverage the benefits of digital technologies.

In the context of organisational change, non-technical inhibitors are seen as equally important to the technical inhibitors, and these vary to include issues influencing the confidentiality of data (Aghimien et al., 2022); such as forcing organisations to take measures against cyberattacks (García de Soto et al., 2022), complexity of the relative supply chain networks (Lavikka et al., 2018); such as forcing organisations to depend

on non-local and foreign expertise (Ayat et al., 2022), and lack of knowledge and information (Berlak et al., 2021); such as forcing organisations to assess the level of their employees' digital literacy (Zulu et al., 2023). This implies that a shift to embrace digitalisation is associated non-conventional challenges that are believed to demand organisational change (Grybauskas et al., 2022). Thus, it is here assumed that neglecting the intra-organisational changes may be undermining broader digitalisation among construction organisations. Overall, research efforts in construction management research seem scarce when illuminating how these challenges are influencing organisational change in the construction context (Nagy et al., 2021), nonetheless, this in turn present an opportunity to explore an unfulfilled knowledge gap. Mainly, digitalisation is seen from the lens of negativism (Svensson, 2022), rather than the highly needed optimistic stance that is vital for driving innovation adoption (He et al., 2022). Therefore, it is imperative to explore the non-technical inhibitors and their role in undermining effective change.

One of the popular models created to help comprehend the needed internal changes is the McKinsey 7-S Framework, which looks at external changes as accompanied with internal changes predominantly in seven key areas of Shared values, Structure, Strategy, Systems, Style, Skills, and Staff (Waterman et al., 1980). The model conceptualises that an organisational change may initiate alterations in the seven organisational factors, imposing plausible challenges for organisations to reinvent the old and traditional processes. The drive behind this choice is the limited use of this model in construction management research compared to other research areas such as healthcare (Scerri and Resident, 2020), education (Paquibut and Naamany, 2020), and automotive (Kukkamalla et al., 2021). McKinsey 7-S has been described as one of the most popular change management frameworks that is highly effective in simplifying the challenges of change, to components that are more manageable (Mulholland, 2021). Thus, its use in this paper offers perceiving the relative challenges associated with digitalisation in construction organisations from a different angle. Therefore, the aim of this study is to examine digitalisation-led intra-organisational challenges. due to adapting to broader digitalisation.

LITERATURE REVIEW

The review of literature suggests the complications associated with adapting to digitalisation at the intra-organisational levels of construction firms. For example, Aghimien et al., (2020) argue that the low adoption rates are linked to the lack of trust of construction organisations with their digital partners supplying the digital systems. This crystalises the importance of collaboration with digital advocates to achieve a common meaning and better implement digitalisation in an effective manner (Aghimien et al., 2022). Moreover, Säynäjoki et al., (2017) raise an important realisation that areas where digitalisation is expanding are most often in pursuit of data without necessarily comprehending the different setting of the construction industry, and thus, such an approach is undermining the values expected from digitalisation. This aligns with Lasarte et al., (2021), who call for the need for accessible value chains and information relative to construction processes. Without doing so, Berlak et al., (2021) warn about the loss of information, and most importantly, the loss of value from digitalisation due to the lack of veracity. Hence, it here becomes clear that the implicit inferred in previous research efforts demands the need to better understand the challenges of organisational changes as a key prerequisite to drive effective digitalisation.

Challenges may be linked to the social system of the organisation, which concerns employees' skill sets and knowledge. Grybauskas et al., (2022) emphasise that digitalisation is 'worsening' employees' divergence in digital literacy, since skill sets are varied, those who often are digitally advanced are so because of their environment rather their own willingness. This interesting proposition touches on the issue of skills and competency in the digital era. Nonetheless, the increasing use of digitalisation in the industry is imposing threats on these organisations to take on board the transformation and seek the skills necessary, which is argued to be achieved through the "mutually constitutive relationships" (Morgan, 2019, p.415), which are relationships nurtured by close monitoring by organisations' leaders. Another challenge imposing complications to the wider use of digitalisation in construction firms is the technological 'revitalisation', as Hewavitharana et al., (2021) reveal that the changing and non-static nature of technologies challenges developing a specific set of skills. The study calls resolving such an issue by having standard digital tools for the different construction purposes. Therefore, an interoperability challenge exists among the existing digital tools and is in turn influencing the overall competency of employees (Lasarte et al., 2021). Hence, there is a need to better understand the nature of skills required by staff as a key prerequisite for an effective adoption.

The fear of associated challenges are widely stated in the existing body of knowledge (Sanchez-Riofrio et al., 2021). Literature reflects that those who are favouring digitalisation may be holding an unreasonable belief that achieving efficiency in imminent and conclusive (Zheng et al., 2021). Such perception may not always be the situation with the adoption of digitalisation in construction organisations (Bazán et al., 2021). This aligns with Aghimien et al., (2021, p.274), who state "the question is not about whether to adopt technology, but how to go about it", as construction organisations are seen as 'too blunt' to accelerate digitalisation in the sector (Sezer et al., 2021). This aligns with Jacobsson and Linderoth (2021), who argue the lack of the sense of urgency in construction organisations as forces that are needed to drive fundamental change. Additionally, Zulu and Khosrowshahi (2021) describe that this issue is linked to the uncoordinated and poor management in construction organisations. These non-technical inhibitors are driven by the vagueness of the benefits and added values associated with digitalisation in the construction context (Demirkesen and Tezel, 2022). Overall, these studies imply issues related to the intra-organisational challenges that need better consideration upon broader digitalisation, which align with Lindblad and Gustavsson (2021, p.33), who emphasise that digitalisation advocates "have to take the intra-organisational change process into account". Intra-organisational change is described to take multiple forms that includes skills, policy, procedures, staff, and other aspects seen as the pillars of an organisation (Walker et al., 2004). Hence, digitalisation can be seen to impose challenges at an intra-organisational level and seeking more coherence on these challenges present a knowledge gap that remains ill-researched in the existing literature.

METHOD

The aim of this study is to explore the challenges facing construction organisations in their quest to cope with broader digitalisation. Due to the lack of studies with a similar aim (Statsenko et al., 2022), the authors' choice of the research method implies an exploratory stance (Hoepfl, 1997). To achieve this, the paper adopts a qualitative method through semi-structured interviews that can capture perceptions, and by that, achieving improved comprehension of the relative social phenomenon (Eisenhardt, 1989). The use of interviews promotes the actor-observer paradigm and equips

research with the interpretations that emerge from viewpoints of those living the experience (Motro and Sullivan, 2022).

The study adopts a purposive sampling strategy based on the selection of participants best suited to the purpose of the study (Unuigbe et al., 2020). Such a sampling approach is believed to align with the context of this study by enabling a targeted selection of interviewees of whom have the appropriate expertise and knowledge to provide an in-depth view of the intra-organisational challenges when adapting to digitalisation. That being said, the sample include organisational leaders from industry (see Table 1) recruited through a knowledge-exchange construction event. Seven organisational leaders participated in the study which was deemed suitable due to the focus on quality of data (insight) (Patton, 1982) and saturation (O'Reilly and Parker, 2013), both of which are key criteria for qualitative methods. The average time of each interview was 30 minutes, and participants were asked about the challenges facing their organisations, staff, and decision-makers as well as the strategies utilised to overcome these challenges. Moreover, questions also promoted discussions to include the values of digitalisation and its adoption.

Data has been analysed thematically and deductively based on pre-determined constructs. Firstly, a thematic analysis employing the procedures outlined by Braun and Clarke (2012), initiated by data familiarisation, followed by data generation and alignment, prior to final reporting. Themes are then deductively formed to fit in constructs of prior knowledge (Thakhathi et al., 2019), which are based on the seven classifications relative to organisational change in the McKinsey 7-S framework (Waterman et al., 1980). Hence, recurring viewpoints by the participants have been grounded within the framework's constructs as the study's theoretical underpinning.

Table 1. Interviewees' roles and experience

#Interviewee	Organisation type	Role	Years of Experience
Participant 1	Consultancy	BIM Manager	Over 20 years
Participant 2	Contracting	CDM Co-ordinator	Over 10 years
Participant 3	Consultancy	Associate Director	Over 10 years
Participant 4	Consultancy	Senior Quantity Surveyor	Over 15 years
Participant 5	Consultancy	Director	Over 10 years
Participant 6	Consultancy	Equity Partner	Over 20 years
Participant 7	Contracting	Director	Over 20 years

RESULTS AND DISCUSSIONS

The recurring viewpoints from the interviewees have been fitted into the seven McKinsey 7-S framework's constructs to help explain the intra-organisational challenges due to changes in the shared values, structure, strategy, systems, style, skills, and staff. The framework has been described by Paquibut and Naamany (2020, p.783), as one "of the most popular approaches used for their ability to breakdown the change process into more manageable components".

Shared values

Achieving a common meaning among all the members of an organisation is driven by having a shared value (Lavikka et al., 2018). One of the values is 'control' stated by

Participant 1 (P01); “It's easier to control, because you're all working on the same platform”, as control promotes the ability to communicate. Additionally, the same participant argues that digitalisation enables meeting clients’ needs and wants; “the client can see what it's actually going to get”, aligning with P05 who states, “we're able to influence the way that clients define what they want”. Achieving a shared value with clients, however, has been described as problematic; “client will want it but don't want to pay any money, regardless of it would save money further down the line. They just want it but don't want cost.” (P02). The matter of shared value relevant to digitalisation has been described as critical in the construction context, as Lindblad and Gustavsson (2021, p.32) state; “the client has to accept the change before they may exert their influence on external actors”. Shared value, in this context, is encouraged to comprise a lifetime perspective, and not otherwise; “All the real benefits of that lifetime cycle are going to be for them rather than short-term things.” (P06). Despite of the internal advantages, achieving a common value with external customers to justify digitalisation is seen as a challenge that hinders broader adoption. Hence, it is here important to note the successes associated with achieving a common value, however, the process of driving such shared perception between the actors is a complex and problematic process.

Structure

The specialisations and the diversified levels and roles in a firm shape the structure of the organisation (Li et al., 2019). One of the key levels described by the participants is the middle managers, whom have an influence on the decision-making; “middle management that's been really hard work. In a battle with them, they're the ones that's been holding me back.” (P01). This aligns with P03 who states that, “the way we've been doing it has sort of been a bottom-up approach. So, people at the mid and junior levels trying to push up the business”. These arguments inform that the willingness and knowledge are the key characteristics driving decision-making as exemplified by P06, stating, “I could see that you would have information director/manager. But on other projects that are a lot smaller, they'll need somebody who's got management knowledge, whether they can only have it part-time to do it right by a director”. Hence, a structure of an organisation is challenged to emphasise the role of middle managers as a key approach to promoting a robust hierarchy that includes effective digital advocates (Zulu et al., 2022).

Strategy

Having the right strategy is a key condition for an effective digital transformation in construction organisations (Shojaei et al., 2022). Participants show a consensus on the challenging nature of developing the correct strategy that embraces digital change by phasing out traditional habits and practices; “how do you send out a document, people do it electronically now, but a lot of people still like a paper copy and paper drawings, well how do you send out a BIM model in that format” (P06). To achieve this, P01 states; “we don't do one process for one project, and another process for another, so we've done it across the board. And that has sort of helped as well.” (P01). Moreover, developing a strategy that welcomes innovations is much cheaper than one that is reluctant; “it's cheaper and easier to accommodate something before you've built it than trying to prevent something afterwards.” (P02). Such arguments align with Beddewela et al., (2021, p.2793), who state that “change process at the intra-organisational level, it is equally likely to face restrictions and problems, such as individual resistance and disagreement”. Hence, traditional strategies are believed to

be challenged into a new paradigm that requires looking at change from a new lens of innovation (Hsu et al., 2019).

Systems

The systems of an organisation are the adopted procedural and operational means based on supporting the organisational strategy (Lundberg et al., 2021). Participants agree that having a procedure in place would facilitate adoption; “it makes our job easier if we've got a proper BIM scheme” (P02). Additionally, the lack of a system in place has as well been flagged as a potential inhibitor undermining digitalisation; “we don't have the facility to gather that kind of information or store that kind of information. It's so humongous.” (P04). These arguments align with P05, who stresses the need for a system that can drive and foster adoption; “if you don't have some sort of framework around them and a framework around the whole team, making them work together, I think that it actually complicates what is already quite a complicated process.”. Therefore, having a rigorous set of procedures to comprise an effective system is a key organisational challenge associated with digital transformation (Wernicke et al., 2021).

Style

An organisational style is referred to the way of thinking relative to managerial influences, forming its culture (Zulu and Khosrowshahi, 2021). Namely, a style that leads to helping others is seen as highly important; “helps the rest of us out with this” (P01). Moreover, higher management advocating change is also seen as important in the transformation; “Some of the guys that we have in the business, the senior directors, they are well into their fifties, and they are the BIM evangelists.” (P03). In contrast, a way of thinking that aims to avoid change is also present among construction organisations; “they don't want to admit that there's something new out there that can improve things, because they don't want to be left behind” (P02). For instance, late adopters who take a conservative stance when looking at change; “we're just going to see how it affects the trade, the construction industry, as a whole, and then we'll adapt to that.” (P04). P07 proposes a style that is believed to embrace change, stating; “We look at different ways of doing things.”. Hence, adopting a style that can discard the old and conventional ways of doing things to a new way of thinking is another challenge associated with change at an intra-organisational level (Burke and Clark, 2016).

Skills

Having the right skills enables individuals belonging to the organisation to perform and carry out the activities needed to deliver the main objectives, which defines its competitiveness in the market (Horbach and Rammer, 2022). Construction organisations may face a substantial challenge when training large number of employees to align with that expected from broader digitalisation; “training was one big issue, especially when you've got 400 people” (P01). The issue has been described as beyond the learning curve itself; “It's not so much a learning curve in terms of being able to do, but it's more a mind thing, whether they'll lock it together.” (P06), aligning with P07, who states; “They know what their systems will do, but they can't advise of what is best or fit for purpose for that individual project, because they don't know the whole picture.”. This reality makes it challenging for construction organisations and imposes the need to search for new skills amidst an already scarce and shortage of skills in the industry; “We've recognised that we need people that are certainly more technology-competent.” (P07). Hence, identifying and employing skill

sets among an organisation is another key challenge accompanied with their organisational changes in pursuit of digitalisation (Helsper and Eynon, 2013).

Staff

Staff refers to the characteristics of the human resources within an organisation and how these align with the organisation's main objectives (Folkestad and Gonzalez, 2010). The staff of construction organisations have been described as varying between those unwilling to change and others who are more open to it; "getting the user to move out the comfort zone into something new. Some people, they want to do it. Others are happy in their own little comfort zone." (P01). Arguably, this has been linked to the demography of staff; "older guys are sometimes more reluctant to do that" (P02). The challenge herewith is seen to be mainly larger than awareness itself; "A lot more people, maybe 90%, know about BIM, but they're not comfortable to really work in that environment." (P03), despite that digitalisation is fairly ensuring a more convenient work environment; "They're not running between office and site anymore, wasting their time." (P07). Hence, a the nature and characteristics of the employed staff within construction organisations impose another challenge for effective change (Jacobsson and Linderoth, 2021).

CONCLUSIONS

Authors of this paper follow a research agenda that aims to set out some of the challenges facing construction organisations amidst change towards broader digitalisation. To explore these challenges, the study adopts the Mackenzie 7-S model that explains and classifies these changes into seven organisational factors. Overall, the viewpoints of seven participants have been explored in pursuit for better understanding of these challenges. This study, hence, illuminates the organisational situated challenges that are of a non-technical nature but are nevertheless believed to inhibit broader digitalisation in the construction sector. Across the seven organisational clusters forming the model, several challenges emerge to undermine the transformation.

Firstly, there is a challenge to achieve a common meaning among all members of the social system of organisations, as justifications for change remain vague despite the demonstrated benefits of digitalisation. In the organisational structure, the role of middle managers to bridge the gap between higher management and digital advocates is presented as a key attribute for change. Moreover, the findings suggest that change is dependent on leaders to create and adopt strategies, procedures, and styles that can create and reinforce the transformation early and adequately, whereas any lag in the creation and reinforcements of any of these factors is believed to drive an ineffective change process. Finally, the study suggests the problematic nature of the skill sets needed to achieve digital transformation, an aspect that is echoed by vast literature reiterating the issue of skill shortages in the industry. This realisation becomes more complicated with the extensive need to upskill existing staff, an aspect that places more pressure on leaders to operationalise approaches that can promote knowledge and training. Overall, the study offers managerial insights to decision-makers on the challenges of broader digitalisation at an intra-organisational level. The results from this study provides an opportunity for future quantitative studies focusing on digital-led intra-organisational changes.

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