A Taxonomy of Digital Leadership in the Construction Industry

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Businesses in the construction industry are experiencing pressure to modernise by embracing digital technologies. Like any other change initiative, digital transformation requires that leaders are at the forefront of their organisations' pursuit for digital innovation. Therefore, the purpose of this study was to explore the different leadership approaches exhibited by construction industry leaders in influencing their organisations' digital paths. Qualitative data collected from 41 construction industry professionals were analysed using an inductive thematic analysis approach. The main finding was a taxonomy of digital leadership types characterised under six themes: proactive and forward-thinking; supportive; uncoordinated; cautious; resistant and visionless & undriven leaders. These themes provide an insight into how leaders influence the digital transformation paths in organisations. As far as the authors are aware, this study is the first that developed a taxonomy of digital leadership approaches in the construction industry. This is a valuable step in understanding leaders' influence in driving digital transformation in the construction industry. Thus, the taxonomy of digital leadership can be used to evaluate leadership styles and attitude towards digitalisation. The findings are also a platform for further studies on digital leadership in construction.

Keywords: leadership; digital leadership; digital transformation; digital innovation; qualitative surveys

Introduction

Organisations are facing unprecedented challenges to cope with an increasing changing digital environment. Emerging digital platforms, growing demand for digital products and services and constantly connected customers (El Sawy et al., 2017) are some of the digital-led challenges organisations face. Organisational change is necessary for organisations to remain relevant and competitive (Kral and Kralova, 2016), as those that do not change put themselves at risk of failure. While there are other factors that influencing organisational change, technology is one of the primary triggers of change (Cox, 2019). Jackson and Harris (2003) examined how the adoption of e-business may result in organisational change, while Greenan (2003) and Pao-Long and Lung (2002) explored the interplay between technological changes and organisational change. Their general argument was that due to technological changes, there are bound to be consequential or complementary changes in other areas of the organisation to create a perfect technology-organisational fit. El Sawy et al. (2017) suggested that, for traditional organisations to be successful in this dynamic environment, major organisational transformation to fit the digital environment is required and that such transformation demands effective digital leadership. Similarly, Kane et al. (2019; 34) argued that "as organisations seek their footing in a turbulent business environment, they require strong leaders at the helm. Senior leaders must not only articulate a vision people can rally around but also create the conditions that enable digital maturity, attracting the best talent and bringing out the best in the talent they attract".

Businesses in the construction industry have not been immune to this and have, over the recent years, seen unprecedented pressure to change due to digital technological

advances. However, the construction industry is perceived to be slow in the uptake of digital technologies to enhance its services, processes and products (Aghimien, et al., 2020). Considering that leadership is critical to organisational innovation's success (Nguyen and Hooi, 2020), construction business leaders are key to driving digital transformation in their organisations. While digital technologies are changing the landscape of doing business, traditional business models are considered less suited to drive digital transformation (Brenner, 2018). From a strategic management point of view, construction business leaders should be at the forefront of driving innovation. However, this requires that they possess digital leadership skills and use appropriate approaches to influence digital transformation in their organisations (Kalyani and Rohidas, 2017).

There is no one standard definition for digital leadership. Goethals et al. (2002:2) distinguished between "leadership in the digital era" and "digital leadership". They defined leadership in the digital era as that required in an organisation in the period of transmission to a more information-dense society, and digital leadership as leadership in the core sectors of the information society such as communication, press or multiple media. Larjovuori et al. (2016:1144) define digital leadership as 'the leaders' ability to create a clear and meaningful vision for the digitalisation process and the capability to execute strategies to actualise it'. Jakubik & Berazhny (2017) argued that leadership definitions depend on the type of context studied. Zhong (2017: 28) contextualised their definition of digital leadership to the education environment and defined it as "using instructional technology, including digital device, service, and resources, to inspire and lead school digital transformation, create and sustain digital learning culture, support and enhance technology-based professional development, provide and maintain digital organisation management, and facilitate and manage digital citizenship". El Sawy et al.

(2016, pp141) definition provides a helpful context of what constitutes digital leadership. They defined digital leadership as "doing the right things for the strategic success of digitalisation of the enterprise and its business ecosystem", taking cues from the definition of leadership as "*doing the right thing* for the success of the organisation" (Bennis, 1989). This is a similar context to Larjovuori et al.'s (2016) definition and is adopted in this study.

Such a definition implies that digital leadership is considered a critical driver for digital innovation in the construction business. While there is a characterisation of leadership in driving initiatives in the construction industry, such as sustainable organisations (Opoku et al., 2015), there is limited consideration of digital leadership characteristics in the construction industry. Zupanacic et al.'s (2016) work is among a few studies that specifically addressed digital leadership in the construction industry, focusing on digital leadership competencies in architectural practices. They developed a digital leadership framework comprising four competence areas: human resource and leadership, architectural design process, digital ecologies, and collaborative environment. Leadership is a broad subject area, and therefore, more studies on digital leadership in the construction industry should be welcome. In addition, while aspects of leadership or management support are acknowledged in studies on digital technology adoption in the construction industry, such as Babatunde (2020), Chan et al. (2019) and Liao and Teo (2019), the context is usually an item within a broader list of influencing factors. They rarely address leadership as a central construct influencing digital adoption. This study contributed to the understanding of broader digital leadership issues in the construction industry. It aimed to identify digital leadership approaches in the UK construction industry, an issue that has received limited attention.

Context: Leadership influence on digital transformation

Digital transformation presents an opportunity for innovation in organisations. It represents a change in, for instance, how the organisation works, the services it provides, technology platforms it uses, how work is organised, and where employees work (El Sawy, et al., 2016). As a change management initiative, it requires effective leadership (Al-Ali et al., 2017). Leadership is seen as a critical factor in supporting change management processes in an organisation (Michaelis, Stegmaier & Sonntag, 2009; Abrell-Vogel and Rowold, 2014). For example, top management support is identified as key to ensuring successful innovation (Elenkov and Manev, 2005) due, in part, to leadership's role in creating an environment that is conducive to innovation (Agbor, 2008). Kane et al. (2019), in their survey of business leaders, identified that technological issues were less critical than leadership related factors such as strategy, culture and talent development were to digital transformation.

Similarly, Anghel (2019:38) asserted that 'digital transformation is less about technological expertise, than it is about perceptions of leaders, managers and employees to buy-in the change process and integrate the organisation's systems with the new digital technologies". They proposed six ground rules for managers and leaders to follow, including having the right mindset, skills and roles, strategy, employees buy-in, resource and utilisation and top management commitment. They argued that without top management commitment, the digitisation process could be compromised. The critical role of leadership is also acknowledged by Cortellazzo et al. (2019), who concluded that leaders are key actors in the development of a digital culture within an organisation.

The effective management of digital transformation is vital if organisations are to experience positive impacts. Business leaders must have skills and commitment to

ensure successful digital transformation. This is demonstrated by management's ability to provide clarity of commitment to digital transformation and the employment of appropriate resources to facilitate digital transformation (MGI 2019). The former represents strategic direction management, while the latter reflects management support for digital transformation in organisations. Both of these management issues are essential to ensure the success of change initiatives. Studies related to change management (Brod, 2018) and organisational studies (Koohang 2017), in general, have demonstrated the influence of leadership on performance. Top management support is among the most critical factors for successfully implementing information systems initiatives (Hwang, 2019). In project management, top management support is frequently identified as a critical success factor or lack thereof as a contributor to project failure (Ahmed and Azmi bin Mohamad, 2016). However, in literature, the discussion of top management support has tended to be addressed as a single dimension and rarely been studied as a multi-dimensional construct (Hwang (2019).

In studies on digital implementation or adoption in the construction industry, leadership, classified in various ways such as top management support, management awareness, top management support and management buy-in, are recognised as critical ingredients to successful implementation. For instance, studies on BIM readiness, such as Ghaffarianhoseini (2016), Chan, Olawumi and Ho (2019) and Liao and Teo (2019), identified leadership as critical to BIM implementation. Like Hwang's (2019) concerns, most of such studies considered leadership or leadership aspects as a single dimension. While in other areas, such as sustainability (Opoku et al., 2015) and health and safety (Cheung and Qingbin, 2016), where the context of the influence of leadership is broad, there has been little consideration of a broader context of leadership characteristics for digital transformation in the construction industry.

The impact of leadership traits and behaviours on organisational processes and outcomes has been well researched (Jansen et al., 2016) and reflects the role of a leader's behaviour as a determinant of organisational performance (Oberer and Erkollar 2018). It is, therefore, not uncommon to see studies evaluating the influence of leadership styles on organisational processes and outcomes (Oberer and Erkollar, 2018). Leadership styles reflect a leader's traits, skills, and behaviours while performing their role (Oberer & Erkollar (2018). The impact of leadership styles on issues such as organisational performance (Rukmani, 2010; Mkheimer, 2018), workplace performance (Wren, 2018), organisational culture (Shao, 2019; Sürücü, 2017), innovation climate (Zuraik, 2018), implementation of initiatives (Tortorella, 2020; Shao et al. 2017), organisational commitment *(*Al-Daibat, 2017) and organisational change (Bligh, 2018) demonstrate the importance of leadership attributes and behaviours in influencing performance and change in organisations. Sow and Abordie (2018) investigated leadership styles that impacted the digital transformation of an organisation. Their findings suggest that leadership style had a significant impact on organisational transformation and played a critical role in the success of the change effort. Kazim (2017) investigated the optimal leadership styles, characteristics, and traits that could enable successful digital transformation in organisations. Their results demonstrated that leaders tended to adapt their leadership styles, characteristics, and traits to change their ways of working to meet expectations and influence ways of working in organisations. Other studies have demonstrated the impact of leadership style on, for example, project performance (Liphadzi, et al., 2015; Limsila and Ogunlana (2008), organisational culture (Wong, 2007), entrepreneurship Orientations (Gumusburun Ayalp, 2019), project teams (Tuuli and Rowlinson, 2010) safety performance (Cheung and Qingbin, 2016; Grill et al., 2019), sustainability initiatives (Opoku et al., 2015),

innovation (Bossink, B. A. (2004) among others. It is therefore argued that construction industry leaders should demonstrate appropriate attributes and behaviours to drive digital transformation. Considering that leadership approaches can influence subordinates' motivation and performance (Drzewiecka and Roczniewska 2018), organisational culture (Shao, 2019) and implementation of initiatives (Tortorella, 2020), it would be expected that leadership approaches would have an impact on digital transformation initiatives in construction organisations. However, the extent to which leadership's traits and behaviours influence digital transformation in the construction industry is an area that has not been extensively researched. There is no study to our knowledge that has addressed the influence of leadership styles or digital transformation approaches in the construction industry. In contributing to the understanding of digital leadership, the study focused on identifying leadership approaches to digital transformation in the construction industry. It addressed the following research question: What are the characteristics of digital leadership approaches in the UK construction industry?

Methodology

The study adopted a qualitative approach and used qualitative questionnaire surveys to collect data. Using a qualitative approach for data collection and analysis can be helpful where the research is exploratory, and the subject lacks *a-priori* theoretical constructs (Madter et al., 2012). Bearing in mind the study's aim, the authors considered that the perception of leadership approaches towards digital transformation would be best reflected in employees' perception, as the leaders' self-evaluation may provide a biased view of the effectiveness of their digital leadership approaches. The study took a

phenomenological perspective as it enabled the collection of data that reflected employees' experiences. Questionnaires have been used in construction management research to collect qualitative data. However, while it is common in construction management research to include qualitative questions in a quantitative-based questionnaire, predominantly qualitative questionnaires where respondents are asked open-ended questions and are required to respond with free textual data are uncommon. Braun et al. (2017:15) suggest that "the method is suitable for exploring people's experiences and their practices, their perceptions and their understandings about the research topic, and for researching sensitive topics". The present study explored perceptions of employees regarding digital leadership in their organisations based on their experiences. Toerien and Wilkinson (2004) contend that qualitative surveys can collect data from a much larger sample, in a shorter time frame, than when using other qualitative data collection methods. The method enabled the researchers to collect data from a relatively larger sample size than what would have been achievable using other methods within the available time frame.

The data was collected through an online survey. The questionnaire contained five open-ended questions designed to gather data about their digital leadership perceptions in the construction industry. The number of questions in a qualitative survey varies from study to study and should reflect its purpose (Braun, et al 2017). This study's qualitative data collection tool contained five open-ended questions dealing with various digital leadership and transformation issues in the construction industry. Issues explored in the five questions include leadership preparedness to navigate the organisation through the digital world, the effectiveness of leaders in driving digital transformation, accelerating digital transformation; barriers to digital transformation; and leadership approach to driving digital transformation. These reflected the broader study's objectives and

research questions and were developed based on the review of literature. The main research question framing the discussion in this paper was: What are the different leadership approaches towards digital transformation in the construction industry? To answer this question, this paper focused on analysing responses from one question that explored participants' perceptions of leadership approaches in their organisations: 'How would you describe the leadership approach by leaders in your organisation regarding driving digital transformation?'.

A two-tier sampling approach was used. First, a convenience sampling approach identified students studying part-time construction-related master's courses at a university as a study population. Convenience sampling in qualitative research is used where study participants are conveniently accessible due to factors such as access, location, time and willingness (Lopez and Whitehead, 2013). However, the approach can introduce sampling error as the sample may not represent the population being studied (Creswell 2007). Sedgwick (2013) suggests a need to inspect the participants' characteristics to assess the extent to which they represent the sample. In addition, the determination of a sampling criterion that specifies the pre-selected inclusion and exclusion criteria is necessary (Lopez and Whitehead, 2013). Considering the study's purpose, it required employees to evaluate their leaders' approaches to digital transformation. Therefore the primary criteria for inclusion in this study was that participants needed to be in employment in the construction industry. Part-time postgraduate students in the study population met the criteria as they worked in the construction industry at various seniority levels and therefore were able to provide their perceptions of digital leadership in their organisations. An inspection of the participants' credentials showed that they would have also qualified as participants in a random probabilistic sampling method. Second, having selected the study group, all individuals

in the study group were invited to complete the online questionnaire anonymously and informed of their participation's voluntary nature.

A total of 43 questionnaires were completed during the two weeks when the survey was open. After reviewing the data, 41 of the responses were included for analysis in this study. Responses from two participants did not meet the inclusion criteria as their responses were generic and did not reflect their lived experiences of working in their organisations. While the sample size may appear small compared to expectations for quantitative questionnaires, large sample sizes are not a critical determinant of the quality of results in qualitative studies (Braun, et al., 2017). In addition, while a large sample size might result in a broad range of issues identified, data from a small sample of individuals who have experienced the phenomenon can be enough to identify the core elements (Starks and Brown Trinidad (2007). A review of studies using qualitative questionnaires shows varying sample sizes. Examples of small sample sizes in qualitative questionnaires include twelve (d'Young, 208); 22 (Fernholm, et al., 2020); 41 (Hanna and Gough, 2019); and 78 (Frith and Gleeson, 2004). Therefore, the sample size of 41 achieved in this study was comparable to the sample size in these qualitative-questionnaires-based studies. Besides, phenomenological studies with a sample size ranging from one to ten persons are not uncommon (Starks and Brown Trinidad, 2007).

Findings

Sample Demography

The primary criterion for inclusion in the study was that participants should be working in the construction industry to reflect on their leaders' approach to digital

transformation. Table 1 below summarises the sample demography. The participants represented various professional roles, with 41% of participants working in quantity surveying and commercial management roles [QSCM]; 24% in design and planning [DAP] (24), management and administrative [MAA] (12%), engineering [ENG] related (10%), building and property management [BAP] (7%) and project management [PM] role (5%). To maintain anonymity, each participant was assigned a code based on the order in which they completed the survey and prefixed by their job role. For instance, participant DAP-P1 was in a design and planning role and were the first to complete the survey.

Table 1: Sample Demography

Category	Frequency	Per cent
Present Job Role		
Design and planning roles [DAP]	10	0.24
Management and Administrative roles [MAA]	5	12%
Quantity Surveying and Commercial Management roles [QSCM]	17	41%
Project management roles [PM]	2	5%
Building and Property Management Roles [BAP]	3	7%
Engineering roles [ENG]	4	10%
	41	100
Position in the organisation		
Middle Managers	2	5%
First Level Managers	6	15%
Professionals	25	61%
Entry Level/Trainees	8	20%
	41	100%
Number of years in employment in the organisation		
Less than 1 year	8	20%
1-2 years	15	37%
3-5 years	10	24%
6-10 years	5	12%
Over 10 years	3	7%
	41	100%
Number of years working in the construction industry		
Less than 1 year	4	10%
1-2 years	5	12%
3-5 years	12	29%
6-10 years	6	15%
Over 10 years	14	34%
	41	100%
Number of Employees in the organisation		
Less than 10	6	15%
Oct-50	7	17%
50-250	11	27%
250-500	3	7%
Over 500	14	34%
	41	100%
Company's Annual Turnover (Millions)		
Less than £1M	7	17%
£1M-£2M	7	17%
£2M-£10M	11	27%
£10M-£50M	5	12%
More than £50M	11	27%
	41	100%

Participants represented different levels of seniority in their organisation. The majority of participants were classified as being in a professional role (61%). Others included middle management (5%), first-level management (15%) and entry-level/trainees (20%). Besides, participants had worked in their organisations for varying length of service. 20% had worked in their organisation for less than one year, while 37% had worked in their organisation for between one and three years; 24% between three and five years, 12% between six and ten years, and 7% for over ten years. At an aggregate level, 80% of the participants had worked in their organisations for at least one year. The data also shows the varying levels of experience working in the construction industry, with 90% of participants working in the construction industry for at least one year and 78% had worked in the industry for at least three years. The participants also worked in companies of various sizes, with most of them being classified as small to medium enterprises. 64% worked for organisations with less than 500 employees while 73% worked for companies with less than £50 million annual turnover. Considering that participants' inclusion criteria were that they needed to have been working in the construction industry, the data shows that the 41 participants were of a suitable profile to inform the study.

Characteristics of construction industry leaders

The focus of data analysis was the determination of the perception of digital leadership approaches in the participants' organisations to organise the digital leadership approaches into 'types'. This formed the basis for determining the taxonomy of digital leadership in the construction industry. The survey data was subjected to thematic analysis following Braun and Clarke's (2006) six phases of analysis: familiarising oneself with the data; generating initial codes; searching for themes; reviewing themes;

defining and naming themes; and reporting. The data was analysed using the inductive

thematic analysis procedure. There are two primary ways in thematic analysis for the

identification of themes within data. One can take either an inductive or 'bottom-up'

approach or a theoretical or deductive approach (Haye, 1997). In distinguishing between

the two approaches Braun and Clarke (2006) characterised 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 was used

in this study, as this is an area with a limited theoretical underpinning in construction

management research. A three-step inductive analysis approach used by Frith and

Gleeson (2004) was employed. First, all the responses were carefully studied to identify

meaningful units of text.

Second, the text was grouped into categories of relevant units of text dealing with the

same issue. These were then given provisional names. Third, provisional names were

systematically reviewed and given contextual definitions. The themes were identified at

a semantic level. The lead author undertook the initial analysis of the data. The resultant

themes were then shared with the co-authors for review. Having undertaken the analysis

and review process, a final list of six leadership themes were generated. These include

forward-thinking and proactive leaders, supportive leaders, uncoordinated leadership,

cautious leaders, resistant leaders, and visionless and undriven leaders. These themes

provide an insight into the perception of participants of how leaders in their

organisations are driving or not driving digital transformations. While representing a

taxonomy of leaders, the themes are not mutually exclusive as, in some cases, a

response from one participant contributed to the generation of one or more themes. It is

possible, for instance, that a supportive leader may also be a cautious leader as they may

be led to be cautious by factors beyond their control. The analytic process, which progressed from the 'description' to the 'interpretation' phases (Braun and Clarke, 2006), is in two parts. First, the identified themes are presented in a narrative format supported by a selection of verbatim comments to illustrate the data patterns. Second, the discussion section that attempts to relate the findings to previous literature is presented.

Forward-thinking and Proactive Leaders

Several participants referred to leaders who are proactive and forward-thinking in digital transformation. These are leaders who are leading by example and seen to take the initiative to adopt digital technologies. Some participants indicated the 'forward-thinking' attitude of their leaders, such as *'Forward-thinking'*. [MAA-P11] or *'Reasonably good, it's a fairly forward-thinking organisation'* [DAP-P27]. These are leaders who are perceived to drive digital innovation and have plans to transition their companies by adopting digital technologies. Forward-thinking leaders seem to have the connotation of leaders who were not waiting for others to ask them to digitise. These leaders are also seen to be proactive and are the ones who take initiatives to digitality transform their organisations. Some of the comments portrayed leaders who are leading the transformation initiatives. Comments such as *'the leadership are fairly pro-active at introducing digital technology ...'*, [DAP-P16] or *'Proactive within the budget limitations'* [MAA-P30] demonstrated this leadership attitude.

Forward-thinking and proactive leaders, in general, were seen to be those leaders who are embracing technology. Their attitude towards digital technology adoption was evident. QSCM-P10 wrote: *'very good,* (and) *seem to be adaptable in embracing*

technology'. These leaders took the lead to drive digital innovation in their organisation. PM-P23's put it that the leadership approach is *'top-down (and) management driven'*. In other cases, there was an apparent dedication to digital innovation, evidenced by structures put in place to drive innovation. In BAP-P9's case, their organisation had a management structure set up to drive innovation and that digital innovation was an issue of importance even discussed with employees at an annual meeting. These are leaders who were also perceived to be embracing technology proactively. However, it was interesting to note that this desire and attitude can be seen to be a necessity and not a luxury as QSCM-P26 noted*: 'They have no choice either adapt to the trend or becoming extinct.'*

Supportive Leaders

Another common trend in the description of leaders was the idea of supportive leaders. These leaders were seen to be supportive of their subordinates to adopt new technologies. They may not be the ones to initiate ideas but are open to suggestions for and encourage digital innovation. Thus, while in the former (forward-thinking and proactive leaders), leaders are seen to take the initiative, here (supportive leaders), leaders are seen to support their staff to innovate. Comments under this theme demonstrated an openness to digital innovation and, therefore, supportive of subordinates' request or suggestions. For example, one participant indicated that: *'Leadership approach (is that of) an open mind(ed) persons, improving organisation system and update the system periodically'* [ENG-P31].

The supportive environment was evident in relatively small firms with a flat organisational structure. In this case, decisions about specific technology adoption were

relatively easy to reach. DAP-P28 responded as follows: *'Because we are a small company there isn't one particular leader, therefore, it is usually a joint decision. If someone has a new initiative it is out to everyone where we have a group discussion on the matter'*. Others indicated, *"… they buy what I will ask them to buy when we need to buy something …'*. [ENG-P37] and *'Overall positive from leadership … with members of staff given time to develop and learn more'* [DAP-P5]. It is evident from these responses that there is a feeling they had leaders who may not be initiators of digital transformation but were supportive of employee's digital transformation efforts.

Uncoordinated Leadership

The data shows that while there are attempts for digital transformations in many construction industry organisations, the digital transformation process is poorly managed in some cases. The leaders in these businesses were characterised in a way that they appear to show uncoordinated leadership. Example statements include: *'Sporadic'* [MAA-P2]; and *'Generically it is poor in my opinion, which is down to a lack of coordination between the top brass'* [PM-P36]. The lack of coordination of digital transformation can be attributed to several reasons. In some organisations with multiple departments or sites, the adoption of technology company-wide may be an issue. For example, in some organisations, one department is eager and driving digital innovation, while in other departments, it is not the case. DAP-P5 notes that: *'Overall positive from leadership within the office. Within other offices, it appears that there is less of a drive to push the software'* [DAP-P5]. While others wrote: *'Some leaders have been driving this as they understand the benefits* [DAP-P33]; and *"… but there's no xxx* [particular technology] *hierarchy to effectively train people on the ground, it does exist but the*

companies run by the xxx [discipline specialism] *side so we've struggled to make as much progress as we could if we'd had more of a hierarchy and they were prepared to employ more people in productivity/organisation/strategy type roles'* [DAP-P27]. Another bemoaned that lack of support and commented: "*the desire to use technology is strong, but there are breakdowns with IT support and training/development and their approach is not particularly fair in the sense that individuals are penalised for not completing tasks even if there is an issue with the technology which is out of their control'.* [QSCM-P19]. These responses demonstrated a lack of a coordinated approach to digital transformation in organisations.

There was also evidence of inadequate or insufficient information flow within organisations. Some of the participant responses disclosed that management appeared not to have put in place a coordinated effort to digital innovation, as evidenced by poor communication. For example, one participant commented that *'... communication to people in non-leadership roles is poor. These people often don't find out about what's being introduced until it's happened, there are often many teething problems'.* [DAP-P16] while another: *'I find it is enforced with lack of understanding or direction leading to impatience and scepticism'—*[DAP-P25]. Internal communication is a critical factor in driving organisational innovation (Lievens, et al., 1999; Räisänen and Tuovinen, 2020; and Sklyar and Sokolova 2019). In particular, information exchange quality can reduce uncertainty, improve organisational climate, and support better cross-functional co-operation in organisations (Lievens, et al.,1999).

Cautious Leaders

Another theme determined from the data was the idea of cautious leaders. Some

participants' responses reflected leaders who were thought of as open to innovation and yet cautious. These are the ones who are making changes with careful considerations. They accept the change or the need thereof but take their time to adopt technologies. DAP-P1 suggests that their leaders are '*accepting, (of the need for digital technology) but wary of change/problems'*. In one organisation, while leaders seem to be cautious, they were described as driving innovation in a '*very methodical* (way and) *changes are met with healthy scepticism and are thoroughly researched before implementation'* [ENG-P14]. In another case, participants noted the limited digital innovation due to a lack of awareness of digital solutions that could help their organisations. This is further illustrated by QSCM-P15, who indicated that "t*he approach is limited at the moment, however, should leaders be provided with a viable digital transformation solution I feel it's integration would be supported by leaders within the business'*.

Resistant Leaders

Another theme that was determined from the data was the idea of leaders resisting digital innovation. These are leaders who are likely to be aware of the need for digital innovation, but for one reason or another, they resist voluntarily or are under pressure not to drive digital innovation. Thus, they may be experiencing resistance or are themselves resistant to digital innovation. [QSCM-P20] wrote simply *'very resistant'* [QSCM-P20]. Others describe leaders who are under pressure to focus on other issues. As a result, they are not dedicating resources to transform digitally. One participant wrote: *'they are focused on the business making a margin and delivering their targets'*. [DAP-P1], while others indicated: *'Managers are keen but encounter resistance from the board, usually down to financial reasons'*. [QSCM-P21] and *'Leaders are*

experiencing ongoing pressure and confusion with how best to maintain a long-term vision and focus necessary to help their business evolve' [QSCM-P4].

Resistance to change is one of the main reasons for failure in change initiatives (Amarantou, 2018). Resistance to change is perceived as a recipients' responses opposing change attempts introduced by the agent (Vos and Rupert, 2018). Thus, subordinates are seen to be resistant to change initiatives introduced by their leaders. While this is the focus of resistance to change in change management literature based on either the recipients or agent's perspectives, the focus here is on the subordinates' perceptions on the resistance of those in power to drive innovation. The participants' responses suggest a willingness to engage with digital technologies. However, this is hindered by their superiors.

Visionless and Undriven Leaders

Another type of leaders identified based on analysis of the responses was the idea of leaders who did not demonstrate having a vision and did not show urgency for their organisations to embrace digital technologies fully. They were perceived to be visionless and or undriven leaders. In the employees' eyes, these are leaders who did not demonstrate visible efforts to drive digital innovation in their organisations. They seem to lack the urgency to digital transformation. It was common to see one-word descriptions of their leadership approach including: *'scarce'* [DAP-P29]; *'None-existent' [QSCM-P18]; 'Poor' [MAA-P34]* and *'almost non-existent'* [QSCM-P35]. Lack of visibility is summarised by another participant who stated: *'The approach is still not clear in our company regarding digital transformation'* [QSCM-P32].

Other respondents appeared equally frustrated. A participant described their leaders as:

'Our leaders have to show more conviction in their leadership. There doesn't seem to be any drive in digital transformation' [QSCM-P3]. Another wrote: *'They don't understand the importance of the digital transformation'* [DAP-P5] while QSCM-P6 wrote: *'Negative and passive approach'*. While in the previous themes discussed above, the leaders seem to be driving innovation, albeit limited in some cases, visionless and undriven leaders did not show any visible sign of having a vision or desire for digital transformation.

Discussion

The findings in this study contribute to the on-going attempts to define and characterise digital leadership. It also provides a valuable platform for the examination of digital leadership in the construction industry. The findings demonstrate that leaders in the construction industry can be characterised on a continuum from visionless and undriven leaders to forward-thinking and proactive leaders with a significant proportion who may be supportive uncoordinated, or cautious leaders. It should be noted that the authors were interested in determining the characteristics of leaders. While in most statements made by respondents, leaders could only fall in one category or another, in some cases, leaders fell in two categories. Take for instance, a response from DAP-P16, who described the leadership approach as '*the leadership are fairly pro-active at introducing digital technology'* (forward-thinking and proactive) while also describing the overall organisational environment as *'... communication to people in non-leadership roles is poor. These people often don't find out about what's being introduced until it's happened, there are often then many teething problems'* (uncoordinated leadership).

The themes characterising digital leadership in the construction industry can also be

aligned with leadership typologies found in general leadership literature. While there was no intention to align the themes characterising digital leadership with particular leadership frameworks or leadership typologies, a review of the themes show an alignment as the identified themes exhibited some traits of leadership typologies described in the literature. For example, leaders characterised as forward-looking and proactive are closely aligned with transformational leaders. Transformational leaders are forward-looking and proactive in shaping their organisations' future (Wu and Wang, 2015). They identify the need for change, envision the organisations and teams and execute the change while motivating others to follow the vision. Stinchcomb (2006, pp 1) suggests that *'by definition, leadership means being ahead of the rest. As such, it is a visionary, forward-thinking process targeted toward proactive strategies'*. Thus transformational leaders create an environment for change, and their attitude may translate into an appropriate employee attitude or behaviour. Evidence demonstrates the role of transformational leadership in encouraging creativity within their organisations. The responses under the forward-thinking and proactive leaders exhibited traits of transformational leadership styles. In particular, it is the leaders who set the tone for digital transformation (Kark, et al. 2018)

The discussion of cautious leaders is usually attributed to political leaders when they are seen not to be instinctive decision-makers but carefully weigh factors before making a decision. For instance, the former Prime Minister of the United Kingdom, Gordon Brown, was described as a cautious leader whose approach was seen as methodical yet slow and obsessed with attention to detail (Theakston, 2011). Curtis (2013, p77) also described the Japanese political leaders as cautious hawks, whose approach focused on taking 'its external environment as a given and then make pragmatic adjustments to keep in step with what the Japanese sometimes referred to as 'the trends of the time'.

Cautiousness can be a limiting factor in digital transformation as it may lead to inaction or delayed action. Cautious behaviour can be evidenced by unassertiveness, resistance to change, risk aversion and slow decision-making processes (Najar et al., 2004). Considering this characterisation of cautious behaviour, both themes' Cautious leadership' and 'resistant leadership' would relate to this leadership type. Cautiousness can be classified as one of the dysfunctional leadership behaviours, including arrogance, cautiousness, volatility and scepticism, which may negatively affect performance (Burke, 2006). The tone of the responses suggests that, in organisations where leaders are perceived to be cautious, there has been limited success in adopting and implementing digital technology in their organisations.

The responses under the supportive leadership theme gave a sense of leaders who give the employees' confidence and support to innovate or acclimatise to a new digital environment. In describing supportive leadership behaviour, Jansen et al. (2016) alluded to the leaders who interact with their subordinates in a supportive way, encourages initiatives, clarifies responsibilities, develops quality group relationships, and demonstrates trust in team members. Thus, supportive leadership is associated with many behaviours, including targeting the satisfaction of subordinates' needs and preferences, positive attitude development, self-confidence, respect for employees, and quality relationships, among others (Yu, 2017). Such behaviour can, in turn, motivate employees task performance. As such, Janse et al. (2016) argue that supportive behaviour is essential in explaining team functioning and outcomes because they affect the commitment and the motivation of team members to use their cognitive skills to their full capacity. Supportive leadership is also acknowledged to be a key determinant of organisational climate. Studies on organisational climate demonstrate the relationship between climate and employee performance. Schyns et al. (2009, p651) suggested that

'a climate of supportive leadership is one where members of the organisation perceive that the leadership is equally highly supportive of them and particularly encourages their empowerment and development'. In relation to the participants' responses, it was evident that in some cases, employees felt supported by their leaders when it came to digital transformation.

The uncoordinated leadership theme can be framed within ideas around distributed leadership. In distributed leadership, rather than focusing on individual leaders' work, it explores the interactions between a layer of leadership functions. Harris (2008 & 2009) points out that distributed leadership recognises that there are multiple leaders and that leadership activity is widely shared 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). Gronn (2002). distinguishes between two forms of distributed leadership, namely, "additive" and "holistic". Additive forms of distribution describe an uncoordinated leadership pattern in which many different people may engage in leadership functions but without much, or any, effort to take account of others' leadership efforts in their organisation (Harris, 2009, Harris and Spillane, 2008).

On the other hand, a holistic distributed leadership suggests consciously managed and synergistic relationships among some, many, or all leadership sources in the organisation (Harris and Spillane, 2008). Findings in this study demonstrated some elements of the 'additive' distribution of leadership as leadership in some organisations lacked a coordinated approach. Such uncoordinated and unplanned leadership can negatively affect organisational growth (Harris, 2009). The frustration in the tone in some of the responses suggests that adopting and utilising digital technologies is

hindered by the uncoordinated leadership exhibited in the organisations.

The last theme generated from the responses represented leadership behaviour that seems to provide no visible direction for digital transformation. The visionless and undriven leaders typify a lack of visible efforts for leadership. The traits exhibited could be loosely aligned with what is described in leadership literature as avoidant leadership. There is an abundance of literature that has focused on transformational and transactional leadership in construction management literature. However, there has been limited consideration of avoidant leadership and its impact on organisation or project processes. Two leadership constructs are considered to be avoidant leadership. These include Laissez-faire leadership and passive management by exception (MBE-passive), a transactional leadership approach (Horwitz et al. 2008; Froom et al., 2012). Laissez-faire leadership style is when leaders shy away from important decisions, abstain from an active leadership role and are reluctant to express views on essential or controversial matters (Froom et al., 2012). The responses in this study seem to suggest that some leaders' approaches could be akin to those who abstained from an active digital leadership role and those who did not clearly express or articulate their digital transformation vision. While the destructive impacts of avoidant leadership are addressed in general leadership literature (Skogstad, 2014), there is no study to our knowledge that has addressed this issue in detail relating to leadership in general or digital leadership, particularly for the construction industry.

Conclusion and Recommendations

This study is timely as there is a push for the digital transformation of the construction industry. The role of leadership and, in particular, digital leadership is vital to drive

digital transformation. The review of the literature did not find a study such as this that focused on the characterisation of digital leadership in the construction industry. While leadership impacts on digital technology adoption are identified in many studies, such consideration looks at leadership as a single dimension. This study is one of a few that we are aware of that has considered leadership as a broad construct influencing digital transformation in the construction industry. The findings from the qualitative survey helped to determine leadership typologies that characterise digital leadership in the construction industry. These typologies, forward-thinking and proactive leadership, supportive leadership, uncoordinated leadership, cautious leadership, resistant leaders and visionless and undriven leaders, provide an insight into digital leadership characteristics of leaders in the construction industry. While the purpose of the study was to characterise digital leadership, the initial identification did not consider their alignment with leadership typologies described in general leadership literature. However, further analysis of the themes suggested that the typologies exhibited some of the traits expected in leadership approaches identified in the literature. Therefore, further studies would benefit from consideration of the extent to which digital leadership approaches in the construction industry align with various leadership approaches and how these, in turn, influence the success of the digital transformation.

We note the methodological limitations of the study. First, the selected study sample may introduce a sampling error that the sample may not be representative of the population. Based on the recommendations in the literature, the sample characteristics were inspected to ensure that the participants fitted the sample inclusion criteria. The sample demography data demonstrated that the participants fulfilled the inclusion criteria and, therefore, answered the questionnaire based on their experience. Second, we acknowledge that the construction industry is represented by various roles and

organisation types, and therefore, the participants in this study do not represent the whole spectrum of the construction industry. Readers should therefore interpret the findings with this limitation in mind. Future studies can build upon our study and evaluate the extent to which these typologies apply in the different organisational settings of the construction industry.

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