

# Organisational Leadership as a Driver for the Adoption of Digital Technologies for Construction Project Delivery



Matthew Ikuabe , Clinton Aigbavboa, Samuel Adekunle, Babatunde Ogunbayo, and Rotshidzwa Mugaga

**Abstract** The uptake of digital technologies for construction activities seek to proffer solutions to some of the challenges plaguing the delivery of construction projects. Organisational leadership players a vital role in the drive for the espousal of digital technologies in construction management. This study evaluates the factors affecting the pursuit of adopting digital technologies by construction organisational leadership. The study utilised a quantitative technique by deploying questionnaire for data collection using built environment professionals as the target respondents and the study area was Gauteng province in South Africa. The methods of data analysis used were Mean Item Score, Kruskal Wallis H-test, and SNK post hoc test. Findings from the study presents influential factors to the adoption of digital technologies by the leadership of construction organisations. The study contributes significantly to the knowledge base on the call for digital transformation in the construction industry.

**Keywords** Construction · Digital Technologies · Drivers · Organisational Leadership · Project Delivery

## 1 Introduction

Construction projects are characterised with dynamic series of planned and unplanned tasks carried out to achieve goals that are often well established or envisaged *ex ante* [1]. With ever-increasing clients' demands in delivering sophisticated building designs, sustainable infrastructure, and projects within the ambits of stipulated standards, the delivery of construction projects is hugely becoming more challenging [2, 3]. These include health and safety challenges, delays in project delivery, cost overrun, and underperforming projects amongst others [4–6]. Despite the intense efforts to abate some of these challenges, not much has been attained.

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M. Ikuabe (✉) · C. Aigbavboa · S. Adekunle · B. Ogunbayo · R. Mugaga  
CIDB Centre of Excellence, Faculty of Engineering and the Built Environment, University of Johannesburg, Johannesburg, South Africa  
e-mail: [ikuabemathew@gmail.com](mailto:ikuabemathew@gmail.com)

Ballard [7] affirmed that some of these challenges are a result of the engaging process peculiar to the construction industry which is quite different from other sectors due to their monotonous system such as manufacturing.

Evidence has shown other industries such as retailing, banking, health, and manufacturing have embraced multifaceted approaches to the uptake of innovative technologies, while the construction industry is still trailing [8, 9]. The espousal of digital technologies has been heralded as one that has the potential to yield process optimisation, cost saving, reduction of task time, and enhanced service delivery [10, 11]. Hence, the propagation for the espousal of digital technologies is timely as it seeks to proffer solutions to the aforementioned issues confronting the construction industry. Moreover, Kamara et al., [12] opined that the construction industry is the right candidate for an upgrade considering the numerous challenges confronting it. However, one significant feature in the drive for the adoption of digital technologies is the role played by organisational leadership among construction organisations. Alade and Windapo [13] noted that role of leadership of construction organisations is vital in its pursuit of digital transformation. Furthermore, Markowitz [14] affirmed that policy makers are significant determinants to propel the uptake of innovative technologies and its attendant benefits resulting. Based on this background, this study seeks to explore the factors influencing the pursuit of adopting digital technologies by construction organisational leadership, with a view to proffering enhancing measures that can aid in propagating the uptake of innovative technologies for construction project delivery.

## 2 Literature Review

The organizational structure is a system of roles, responsibilities, authority, and communication links that are designed to assist an organization in accomplishing its tasks and meeting its objectives [15]. Transformational leadership refers to adaptive leadership behavior that has been shown to influence innovation, particularly the tendency of organizations to innovate. The development of observable administrative processes is referred to as organizational structure, whereas social interactions, which are ethereal in nature, assist the coordination of organizational members [16]. The degree to which organization leaders completes tasks or achieves its objectives is known as leadership effectiveness [17]. Hence, the hierarchal structure of organisations must encourage the development of a business climate that strives to improve the delivery mandates of the organisation and also push for the attainment of core objectives set by the organisation.

According to Dall'omo [18], implementing new technologies comes at a high cost. Therefore, the availability of the financial resource would play a vital role in the choice of digital transformation by organisations. Also, the cost implication of training the required personnel plays a determining role towards its uptake. Moreover, cost of maintenance is a considerable influential factor in the deliberations of digital transformations [19]. For construction organisations, the ability to properly define

the potential benefits resulting from the uptake of a given innovative technology would significantly influence the choice of its adoption [20]. Usually, this would entail development strategies by engaging in analysis or assessment of its uptake. Furthermore, organisations are undecided on the need to engage in research and development. This is as a result of the uncertainty of the potential yields from such an investment [21]. Investments in research and developments would potentially serve as a driver for the espousal of innovative technologies by construction organisations. Also, the return on investment serves as a considerable influence in the choice of digitalisation by organisations [22, 23]. This is propelled by the need for organisations to seek profitability in investments made.

Data security and protection is a considerable factor in the pursuit of innovative technologies by organisational leadership of construction organisations. Qu et al. [24] noted that construction organisations are particular about data protection and cyber security in the pursuit of digital transformation. Moreover, the support of top management of construction organisations is a significant determinant in pushing the transformation pursuit through digitalisation. Ofori and Toor [25] stated that the support of the top hierarchy of construction organisations would help expedite the motive or agenda under focus. Moreover, the strategy employed by organisations is influential to construction organisations' digital transformation. Strategies employed by organisational leadership is influential to the actualisation of digital transformation of the organisation [19]. The organisational culture attributed to construction organisations plays a vital role in influencing the decision by organisational leadership to embark on inculcating digital technologies for project delivery [26]. Also, the strategies deployed by competitors serve as being influential towards determining the need of digital transformation by construction organisations [27]. Since construction is a competitive business, organisational leadership of construction organisations would aim to keep tabs of competitors' strategies in order to maintain a comparative advantage for a favourable business environment.

### 3 Methodology

The study assessed the factors influencing organisational leadership of construction organisations to adopt digital technologies for construction projects. After the review of extant literature, factors were identified which were subsequently presented to construction professionals for rating based on their level of significance. This was actualized with the use of a well-structured questionnaire which consisted of two sections. The former focused on the demographic information of the respondents while the latter was focused on the identified factors for rating by the respondents. The target respondents of study which are construction professionals were architect, quantity surveyors, construction managers, engineers and project managers. Convenience and snowball sampling technique was adopted for the study, while the area of study was Gauteng province of South Africa. A total of seventy-four responses was retrieved and deemed appropriate for analysis. The methods of data analysis

employed for the study was mean item score, Kruskal-Wallis (K-W) H-test, and Student Newman Kauls (SNK) post-hoc test. Mean item score was used in ranking the identified factors as rated by the respondents, while Kruskal-Wallis H-test was deployed to ascertain if there is a statistical difference in the opinion of the groups of respondents based on their professional affiliation. While the SNK post-hoc test was employed in differentiating the mean responses of the respondents based on their professional designation.

## 4 Findings

A total of fourteen factors were identified after the review of extant literature and thereafter presented to the respondents of the study for rating based on their significance. Table 1 presents the result of the ranking of the factors and also the result of the analysis of *K-W* test conducted. The findings from the table indicates that the most rated factors influencing construction organisational leadership in the adoption of digital technologies are return on investment with a mean score of 4.34, top management support having a mean score of 4.27, financial resource with mean score of 4.19, organisational culture and definition of benefit with usage with mean scores of 4.04 and 4.00 respectively. It is observed that all the factors have a mean core above 3.00, thus implying their significance. Furthermore, the result from the *K-W* test shows that there is no statistical significance difference in the opinions of the group of professionals for thirteen of the identified factors. This is because these thirteen factors all have a *p*-value above 0.05, thereby indicating that there is a convergent view among the different professionals on these factors. However, there is a discrepancy in views of the group of respondents on one of the factors (personnel training) due to the derived *p*-value of the factor being less than 0.05. This might be as a result of the different professional designations having different core professional mandates in delivery of construction projects.

Table 2 portrays the result of the SNK post-hoc test (multiple comparison) conducted for the study to showcase the mean difference of the group of respondents. The findings of the test shows that there is a significant difference in the factors influencing organisational leadership in adopting digital technologies among two groups of the respondents. The first group is made up of quantity surveyors and engineers with values of 2.7723 and 2.9148 respectively. While the other group comprises of construction managers, project managers and architects with values of 3.1052, 3.4992, and 3.6782 respectively.

**Table 1.** Factors influencing organisational leadership in adopting digital technologies

Factors	$\bar{X}$	R	K-W	
			X <sup>2</sup>	Sig
Return on investment	4.34	1	1.319	0.290
Top management support	4.27	2	5.836	0.411
Financial resource	4.19	3	3.227	0.537
Organisational culture	4.04	4	7.092	0.465
Definition of benefits with usage	4.00	5	6.295	0.071
Organisations' objectives	3.95	6	4.003	0.173
Business environment	3.72	7	1.842	0.092
Market orientation	3.71	8	3.849	0.484
Organisation's strategy	3.69	9	2.274	0.712
Personnel training	3.62	10	1.582	0.021*
Organisation's corporate image	3.58	11	4.692	0.873
Competitive pressure	3.55	12	5.826	0.159
Research and development	3.42	13	8.379	0.585
Data security and privacy	3.37	14	6.662	0.231

**Table 2.** SNK Post Hoc Test

Groups	N	Subset for alpha = 0.05	
		1	2
Quantity Surveyors	14	2.7723	
Engineers	14	2.9148	
Construction Managers	14		3.1052
Project Managers	14		3.4992
Architects	14		3.6782
Sig		1.000	0.668

Means for groups in homogeneous subsets are displayed.  
 a. Uses Harmonic Mean Sample Size = 14.000.

## 5 Discussion of Findings

Main factors to organisational leadership of construction organisations to the adoption of digital technologies was assessed in this study. Findings from the analysis conducted shows that the most influential factor is return on investment. This finding is corroborated by Oh et al., [22] who noted that the return on investment serves as a considerable influence in the choice of digitalisation by organisations. Moreover, organisations are propelled to commit funds for digital technologies when there is a clear mandate that the investments would yield financial returns [23]. Generally, the driving idea of engaging in digital transformation by organisational leadership is the

assurance of attaining financial advantage. Furthermore, the study reveals that top management support is a significant factor in the quest for digitalisation by construction organisations. Ofori and Toor [25] stated that the support of the top hierarchy of construction organisations is crucial to important decisions of construction organisations. Hence, the support of top management of construction organisations is a significant determinant in pushing the transformation pursuit through digitalisation. Also, the financial resource at the disposal of the organisation is a considerable determinant in the choice of digitalisation by organisational leadership. According to Zhang et al. [21], implementing new technologies comes at a high cost. Therefore, the availability of the financial resource would play a vital role in the choice of digital transformation by organisations. Additionally, it is revealed that all the group of professionals making up the respondents for the study all have a convergent opinion on all the identified factors for the study except for personnel training. This might be as a result of the different professional designations having different core professional mandates in delivery of construction projects, thereby having different obligations with the digitalisation process.

## 6 Conclusion

The study assessed the factors influencing the pursuit of the adoption of digital technologies by construction organisational leadership. Subsequent to the review of literature, the study identified fourteen factors which were presented to the respondents of the study for rating with the use of a well-structured questionnaire. Retrieved data was subjected to statistical analysis which revealed the most significant factors as return on investment, top management support, and financial resource. Also, it was shown that there was a divergent view among the group of respondents in only one of the factors, which is personnel training; while other factors saw a convergent view among the group of professionals. Based on the findings of the study, it is recommended that organisational leadership of construction organisations should encourage digital transformation of construction organisations since it guarantees effective construction processes, efficient service delivery and optimisation of resources is guaranteed. Consequently, yielding to a potential return on investment in the digitalisation process. Also, the drive for the uptake of digital technologies should be one that should get the support of top management of construction organisation since they play a vital role in the management of organisations.

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