



THE IMPACT OF DIGITAL TRANSFORMATION ON WORKFORCE WELL-BEING AND EMPLOYEE PRODUCTIVITY IN CONSTRUCTION COMPANIES: AN EMPIRICAL STUDY

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Abstract:

The construction industry is undergoing digitalization by adopting digital technologies such as building information modelling (BIM), artificial intelligence (AI), cloud computing, the internet of things (IoT), and mobile project management applications. There is a growing body of literature on the benefits of digital transformation in the construction industry. However, there is limited information on the impact of digital transformation on employee-related outcomes. This study focused on the impact of digital transformation on the workforce well-being of employees working in construction companies. A quantitative research design was used for the study. The study's target population comprised construction workers in construction companies. A convenience sampling technique was used to select 43 respondents from the target population. The Statistical Package for Social Sciences (SPSS) software was used to analyze the study results. Descriptive statistics, reliability analysis, Pearson correlation, and simple linear regression were conducted. The study's findings will contribute to the body of knowledge by providing evidence on the effect of digital transformation on workforce well-being and employee productivity. Besides helping inform managers' decisions on human-related considerations in digital transformation, the findings will also add to the literature on digital transformation by providing a study that evaluates both technology and employee aspects.

Keywords: Digital transformation, Workforce Well-Being, Employee Productivity, Construction companies, Digital technologies, Organizational performance.

1. Introduction

The construction industry is an essential pillar of the economy as it facilitates the creation of infrastructure and generates employment. However, with the rising complexity of construction projects and the need for more competitive pricing, construction companies are forced to consider innovative ways of improving performance.

One of the ways that have been increasingly used in the construction industry is through digital transformation. Digital transformation can be defined as the process of incorporating digital technologies into business operations to improve decision-making, teamwork, operational performance, and overall business value. Construction companies are turning to digital technologies such as building information modelling (BIM), artificial intelligence (AI), internet of things (IoT), cloud computing, drones, and mobile project management applications to make them more competitive. Besides enhancing performance, digital technologies may improve the well-being of employees in construction companies.

Digital technologies can improve employee well-being by supporting decision-making, improving information exchange, and facilitating efficient collaboration among employees. As a result, the use of digital technologies may lead to increased workforce well-being and, consequently, improved employee productivity. Although there is a significant amount of literature demonstrating the benefits of digital transformation, little research has focused on the impact of digital transformation on workforce well-being and employee productivity in the construction industry. Thus, this study aimed to establish the effect of digital transformation on the workforce well-being and employee productivity of construction companies. The study used a quantitative research design to achieve its objectives. The study's findings will contribute to the body of literature on the effect of digital transformation on workforce well-being and employee productivity. Additionally, the findings will help construction companies make better-sounding decisions regarding digital transformation.

2. Literature review

2.1 Digital transformation

Organizations implement digital transformation to increase their performance and obtain competitive advantage over others. The term comprises activities and processes that go beyond technology adoption and integration. Researchers have variously attributed digital transformation's attributes to the reorganization of an organization's functions, operations, and structures by leveraging digital technologies. For example, Vial (1) asserted that it is an organizational process that entails the transformation of a firm's business models and operations using digital technology. Verhoef *et al.* (2) equally agreed that it is a multidisciplinary reform process whereby firms re-strategize their approaches and capabilities to obtain substantial improvements in their functions and customer relationships.

In the construction industry, digital transformation has entailed the use of building information modelling, artificial intelligence, cloud computing, and internet of things, among others. These technologies have improved collaboration, planning, and management of construction projects while also shortening delivery times. Generally, Olanipekun and Sutrisna (3) explained that construction companies adopt digitalization to improve their performance through enhanced organizational readiness, workforce capabilities, and collaborative behaviors. Thus, the concept entails a range of activities and processes that enable organizations to gain substantial improvement in their capabilities, which consequently affects organizational and employee-related outcomes.

2.2 Workforce well-being

The general meaning of the term workforce entails individuals employed in a firm or organization. However, researchers have used the term workforce to describe a group of people working together to achieve collective goals. Workplace well-being comprises employees' medical, social, and psychological aspects, including their working conditions (4). On the other hand, Grant *et al.* (5) and Page and Vella-Brodrick (6) explained that

employee well-being is a broad perspective that encompasses employees' psychological, physical, and workplace well-being. Most organizations acknowledge the significance of maintaining a healthy workforce and creating excellent working conditions because it facilitates achieving organizational objectives through improved employee performance.

Digital transformation has immensely affected employees' working conditions through the introduction of new digital technologies that support their activities and promote their overall well-being. Parker and Grote (7) explained that if properly harnessed, the changes brought about by digitalization could have a positive effect on employees' well-being. Researchers equally concur that the introduction of digital technologies in the workplace could adversely affect staff's well-being if they do not possess the required skills and abilities to embrace the changes (8). In construction organizations, the use of digital technologies has improved collaboration, communication, and information exchange among employees, which has positively influenced their overall well-being.

2.3 Employee productivity

The term employee productivity entails the amount of work done by an individual using the firm's resources, knowledge, and capabilities. Generally, most researchers define employee productivity in terms of the inputs utilized by workers in the production process. For instance, Tangen (9) argued that it is a measure of how effectively the organization transforms its inputs into valuable outputs. Drucker (10) equally asserted that it is the ability of workers to increase organizational effectiveness through their efforts, energy, and knowledge.

Studies indicate that digital transformation has improved employee performance by enhancing communication and collaboration, among other things. For example, Vial (1) and Verhoef *et al.* (2) explained that the use of digital technologies in business processes has improved organizational capabilities, which, in turn, boosted employees' performance. In construction organizations, the use of building information modelling, digital scheduling, mobile applications in construction sites, and cloud-based platforms have improved collaboration, planning, and management of construction projects while also reducing operational errors (3). As a result, the study assumes that digital transformation will have a positive effect on employee productivity.

2.4 Digital transformation and workforce well-being

The relationship between digital transformation and workforce well-being has been the focus of several studies. Digital technologies have improved communication and information exchange processes among employees while also making their work easier. Researchers have shown that the success of digital transformation largely depends on staff's willingness and readiness to accept the changes brought about by the use of these technologies. For instance, Vial (1) and Verhoef *et al.* (2) argued that organizational readiness and employee acceptance determine the extent to which digital transformation will occur in an organization. Parker and Grote (7) equally asserted that when effectively leveraged, digital technologies could positively impact employees' well-being. On the other hand, Tarafdar *et al.* (8) stated that if poorly implemented, these technologies could adversely affect workers' psychological well-being. Therefore, the study expects to establish a positive relationship between digital transformation and workforce well-being.

2.5 Digital transformation and employee productivity

Earlier studies have demonstrated the positive effect of digital transformation on employees' performance and behavior. Digital technologies have improved organizational processes, communication, and collaboration, which,

in turn, have boosted employee productivity. The researchers explain that the use of these technologies has enhanced organizational flexibility, innovation, and knowledge development, among others. For instance, Warner and Wäger (11) reported that digital transformation improves flexibility, which promotes employee productivity. Nambisan *et al.* (12) equally found a positive relationship between the adoption of the technologies and improved organizational flexibility, innovation, and knowledge sharing. In construction companies, digitalization has been a great step towards improving planning, designing, constructing, and managing processes, which boosts overall performance (3). Therefore, the study expects a positive association between digital transformation and employee productivity.

2.6 Research gap

Prior studies on digital transformation were conducted focusing on the aspects of technology, operations, project progress, and competitive advantage. Even though there were extensive prior research on workforce well-being and employee productivity, these variables were considered independently. The aspect of digital transformation's effect on workforce well-being and employee productivity was limited and isolated. Previous studies have not demonstrated the connection between digital transformation, workforce well-being, and employee productivity in one model in the construction industry. Additionally, the effect within the context of Indian construction companies was rarely considered. This study aims to contribute to addressing the identified research gap. The current research considers the impact of digital transformation on the workforce well-being and employee productivity of construction companies' employees.

3. Research objectives

The present study aims to examine the impact of digital transformation on workforce well-being and employee productivity in construction companies. The specific objectives are:

- To examine the level of digital transformation adopted in construction companies.
- To assess the impact of digital transformation on workforce well-being in construction companies.
- To evaluate the impact of digital transformation on employee productivity in construction companies.
- To recommend strategies for enhancing workforce well-being and employee productivity through digital transformation initiatives.

4. Research hypotheses

Based on the review of literature and the proposed conceptual framework, the following hypotheses were formulated:

- **H1:** Digital transformation has a significant positive impact on workforce well-being in construction companies.
- **H2:** Digital transformation has a significant positive impact on employee productivity in construction companies.

5. Conceptual framework

The conceptual framework was formulated from the reviewed literature to establish the relationship between digital transformation and the effect on employees in construction companies. In the framework, Digital Transformation has been taken as an independent variable while Workforce Well-being and Employee Productivity are dependent variables. The framework hypothesizes that the adoption of digital technology has a positive influence on workforce well-being and employee productivity by enhancing communication,

collaboration, information access, and operational efficiency.

The conceptual framework illustrating the proposed relationships among the study variables is presented in Figure 1.

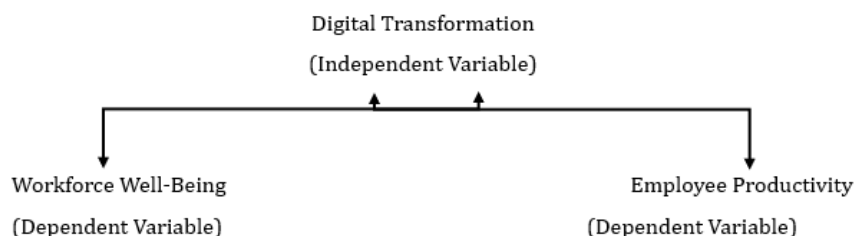


Figure 1: Conceptual Framework of the Study

6. Research methodology

6.1 Research design

The study adopted a quantitative, descriptive, and explanatory research design to establish the effect of digital transformation on the well-being of the workforce and employee productivity in construction companies.

6.2 Population, sampling technique, and sample size

The population of the study comprised of employees working in construction companies who have interacted with digital technologies. The study adopted a non-probability sampling technique because of ease of use and timesaving. Specifically, the research adopted a convenience sampling technique to identify research participants. Forty-three (43) respondents participated in the study. The data collected from the questionnaires were used for the study's statistical analysis.

6.3 Sources of data

Both primary and secondary data sources were used in the study. Primary data were collected using a questionnaire while secondary data were obtained from published journals, magazines, newspapers, books, and other resources related to digital transformation, employee well-being, and employee productivity.

6.4 Research instrument

A questionnaire was used to collect data from the respondents. The document comprised both demographic questions and questions related to the study's research. The questions were scored on a five-point Likert scale from 1 disagree to 5 strongly agree.

6.5 Variables of the study

Variable type	Variable
Independent Variable	Digital Transformation
Dependent Variable	Workforce Well-Being
Dependent Variable	Employee Productivity

6.6 Statistical tools for data analysis

The IBM Statistical Package for Social Sciences (IBM SPSS) was used to analyze the study's data using descriptive statistics, reliability analysis, Pearson-product moment correlation, and simple linear regression analysis. Descriptive statistics were used to determine the mean and standard deviation of the study's data set. On the other hand, reliability analysis helped assess the degree to which the study's research instrument measured what it was intended to measure with Cronbach's Alpha Coefficient analysis. The Pearson-product moment correlation was

used to determine the relationship between the study's variables, while simple linear regression was used to test the study's theoretical framework and hypothesis.

7. Results

7.1 Reliability analysis

A reliability analysis was performed to assess the study's measurement model's internal consistency. A reliability analysis helps determine the degree to which the study's research instrument measures what it is intended to measure. Specifically, the study used Cronbach's Alpha Coefficient analysis. A Cronbach's Alpha value of 0.70 and above is a good indication of the reliability of the study's measurement model. A reliability analysis was performed for each of the three constructs: Digital transformation, employee well-being, and employee productivity.

Table 1: Reliability Analysis of the Study Constructs

Construct	Number of items	Cronbach's Alpha	Interpretation
Digital Transformation	7	0.832	Very Good Reliability
Workforce Well-Being	3	0.733	Good Reliability
Employee Productivity	5	0.920	Excellent Reliability

Source: Computed using IBM SPSS Statistics based on primary survey data.

Interpretation

From the table above, all the three constructs had a satisfactory reliability score. In the case of the Digital Transformation, a Cronbach's Alpha of 0.832 was recorded which implies a very good reliability score for the 7-item measure used to assess the construct. On the other hand, a Cronbach's Alpha of 0.733 was recorded for Workforce Well-Being which is above the recommended threshold of 0.7 and indicates good reliability for the 3-item measure used to evaluate the construct. Finally, an excellent reliability score of 0.920 was recorded for Employee Productivity which implies that there is excellent internal consistency for the 5-item measure used to assess the construct. Since all the reliability scores recorded were above the recommended threshold of 0.7, all the items used to measure the constructs were retained for the purposes of the analysis.

7.2 Descriptive statistics

Descriptive statistics were performed to examine the research variables by reporting the Minimum, Maximum, Mean, and Standard Deviation of Digital Transformation, Workforce Well-Being, and Employee Productivity. The results of the descriptive statistics analysis are presented in Table 2 below.

Table 2: Descriptive Statistics of the Study Variables

Variables	N	Minimum	Maximum	Mean	Standard Deviation
Digital Transformation	43	1.43	5.00	4.103	0.633
Workforce Well-Being	43	2.67	5.00	4.388	0.600
Employee Productivity	43	2.40	5.00	4.205	0.612
Valid N (Listwise)	43	–	–	–	–

Source: Computed from Primary Data using IBM SPSS Statistics (Version 26).

Interpretation

The descriptive statistics analysis was performed on 43 valid responses to establish the mean, median, minimum, maximum, and standard deviation of the study variables. From the results, each of the variables had a mean score of above 4 which implies that respondents had a positive perception of Digital Transformation, Workforce Well-

Being and Employee Productivity. Specifically, Workforce Well-Being had the highest mean score ($M = 4.388$, $SD = 0.6$) compared to Employee Productivity ($M = 4.205$, $SD = 0.612$) and Digital Transformation ($M = 4.103$, $SD = 0.633$). In addition, the small standard deviation recorded for each variable implies that respondents' perceptions were clustered around the mean which suggests that the scores were consistent.

7.3 Correlation analysis

The Pearson's correlation analysis was performed to establish the relationship between each of the study variables. The analysis involved assessing the degree of association between Digital Transformation and Workforce Well-Being, Digital Transformation and Employee Productivity as well as Workforce Well-Being and Employee Productivity. The results of the Pearson's correlation analysis are presented in Table 3 below.

Table 3: Pearson Correlation Matrix

Variables	Digital Transformation	Workforce Well-being	Employee Productivity
Digital Transformation	1	0.523**	0.573**
Workforce Well-being	0.523**	1	0.700**
Employee Productivity	0.573**	0.700**	1

**Note: Correlation is significant at the 0.01 level (2-tailed).*

Source: Computed from Primary Data using IBM SPSS Statistics (Version 26).

Interpretation

The results presented in Table 7.3 above indicate that there is a positive correlation between Digital Transformation and Workforce Well-Being ($r = 0.523$, $p < 0.01$) as well as between Digital Transformation and Employee Productivity ($r = 0.573$, $p < 0.01$). In addition, the results show that there is a positive correlation between Workforce Well-Being and Employee Productivity ($r = 0.7$, $p < 0.01$). In general, the results indicate that a unit increase in Digital Transformation leads to a 0.573 increase in Employee Productivity and a 0.523 increase in Workforce Well-Being. Similarly, a unit increase in Workforce Well-Being leads to a 0.7 increase in Employee Productivity. Thus, from the results, it can be concluded that all the study variables have a significant positive relationship with each other.

7.4 Regression analysis

Regression analysis was performed to further establish the relationship between Digital Transformation and each of Workforce Well-Being and Employee Productivity. In this case, Digital Transformation is the independent variable while Workforce Well-Being and Employee Productivity are the dependent variables. The regression results are presented in Table 4 below.

Table 4: Summary of Regression Analysis

Hypothesis	Relationship	B	β	R ²	F	t	p-value	Decision
H1	Digital Transformation → Workforce Well-being	0.495	0.523	0.273	15.412	3.926	0.000	Accepted
H2	Digital Transformation → Employee Productivity	0.554	0.573	0.329	20.058	4.479	0.000	Accepted

Source: Computed from Primary Data using IBM SPSS Statistics (Version 26).

Interpretation

From the regression analysis results, Digital Transformation has a significant positive effect on Workforce Well-Being and Employee Productivity. In the case of Workforce Well-Being, the results indicate that the regression model predicted 27.3% of the variance in Workforce Well-Being and that the relationship between Digital Transformation and Workforce Well-Being is significant at the 0.001 level ($F = 15.412, p < 0.001$). Specifically, every unit increase in Digital Transformation leads to a 0.523 increase in Workforce Well-Being ($\beta = 0.523, B = 0.495, t = 3.926, p < 0.001$). Thus, H1 which states that Digital Transformation positively predicts Workforce Well-Being is accepted.

On the other hand, in the case of Employee Productivity, the results indicate that the regression model predicted 32.9% of the variance in Employee Productivity and that the relationship between Digital Transformation and Employee Productivity is significant at the 0.001 level ($F = 20.058, p < 0.001$). Specifically, every unit increase in Digital Transformation leads to a 0.573 increase in Employee Productivity ($\beta = 0.573, B = 0.554, t = 4.479, p < 0.001$). Thus, H2 which states that Digital Transformation positively predicts Employee Productivity is also accepted.

8. Discussion of findings

The current research study examined the impact of Digital Transformation on Workforce Well-being and Employee Productivity of construction companies. The findings of the study indicate that Digital Transformation has a positive influence on both Workforce Well-being and Employee Productivity. The study's regression results revealed that Digital Transformation significantly predicted Workforce Well-being ($\beta = 0.523, p < 0.001$) and Employee Productivity ($\beta = 0.573, p < 0.001$). As a result, both H1 and H2 were accepted. Thus, the study's findings reveal that construction companies that embrace Digital Transformation record a positive change in employee well-being as well as increases their employee productivity levels.

The findings of this study add to the body of knowledge in several ways. First, the findings concur with the arguments of Vial (1) who asserted that Digital Transformation contributes to the rise of organizations through the use of digital technologies to re-invent business models. Secondly, Verhoef *et al.* (2) agree that Digital Transformation promotes organizational performance, operational efficiency, and value delivery by leveraging the potential of digital technologies. In addition, Parker and Grote (7) expound on the view that successful digital transformation encourages employee productivity and satisfaction thus promoting positive work outcomes. Similarly, Tarafdar *et al.* (8) argue that appropriate digital transformation coupled with the right organizational infrastructure can lead to positive employee wellbeing while eliminating technology-induced stress.

Furthermore, the findings of the current study support the arguments put forward by Olanipekun and Sutrisna (3) in their study on the impact of digital technology on project management practices in construction organizations. According to their study, digital technologies improve communication, coordination, and collaboration which in turn boosts productivity levels in construction projects. Lastly, the findings of this study are consistent with the assertions of earlier studies that argue that digital transformation of organizations enhances employee performance and productivity through improved processes and systems (11,12).

9. Practical implications

The findings of this study have several practical implications for construction companies, managers, and policymakers. Since Digital Transformation was found to have a positive influence on both Workforce Well-being

and Employee Productivity, it is important for managers and organizational leaders to invest in digital technologies in order to improve performance while also boosting employee wellbeing. As such, construction companies should consider adopting the most relevant technologies and systems to improve operations and support employees.

Additionally, the findings of this study can be used to formulate new policies aimed at boosting employee wellbeing while also promoting digital transformation in the construction industry.

10. Limitations of the study

This study has several limitations that should be considered when interpreting the results. First, the study had a small sample size and was limited to the construction industry. Secondly, the study used a cross-sectional research design which meant that the impact of digital transformation on the study variables could not be established. Lastly, the study relied on self-reported questionnaires which may have introduced various biases that might have affected the results.

11. Future scope of the study

The scope of future research can be expanded in several ways. First, future research can use a larger sample size in order to increase the accuracy of the results. Secondly, the study can be replicated in other industries such as manufacturing, healthcare, information technology, and banking in order to compare results. Lastly, future research can take alternative approaches such as examining the mediating and moderating influences of several variables on the relationship between Digital Transformation and employee outcomes.

Conclusion

The current study examined the impact of Digital Transformation on Workforce Well-being and Employee Productivity in the construction industry. A quantitative methodology was used to gather and analyze the data which led to some interesting findings. Digital Transformation was found to have a positive influence on Workforce Well-being and Employee Productivity. Regression results revealed that Digital Transformation significantly predicted both Workforce Well-being ($\beta = 0.523, p < 0.001$) and Employee Productivity ($\beta = 0.573, p < 0.001$). Thus, both H1 and H2 were supported by the study's findings and were, therefore, accepted.

The results of this study make several contributions to the body of knowledge on digital transformation and employee performance. First, the study confirmed that digital transformation is an important process that leads to positive performance outcomes in construction companies. Secondly, the findings revealed that in order to achieve positive benefits of digital transformation, organizational support, and employee skills are of utmost importance. Overall, the current research provides a comprehensive understanding of the impact of digital transformation on employee performance within the construction industry.

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