

IMPACT OF DIGITAL TRANSFORMATION ON EMPLOYEE ENGAGEMENT AND PRODUCTIVITY IN THE NIGERIAN OIL AND GAS INDUSTRY

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Abstract

Digital transformation is progressively altering how businesses operate internationally. In the Nigerian oil and gas business, digital efforts are being embraced to promote efficiency, decrease operational risks, and improve competitiveness. However, the human impact remains underexplored, notably on employee engagement and productivity. This study analyses how digital transformation effects employee engagement and productivity in selected oil and gas industries in Nigeria. Data were obtained from 300 individuals across management and technical jobs using a quantitative survey design. Structural equation modelling was employed to evaluate two assumptions. Results demonstrated that digital transformation had a statistically significant beneficial influence on both employee engagement ($\beta = 0.54, p < 0.01$) and productivity ($\beta = 0.49, p < 0.01$). The findings imply that successful implementation requires technical investments, comprehensive change management strategies, and staff support mechanisms. Recommendations include investing in digital skills training, fostering inclusive decision-making throughout technology adoption, and aligning HR policies with digital transformation goals.

INTRODUCTION

The Nigerian oil and gas sector has consistently served as the foundation of the nation's economy, significantly contributing to both the Gross Domestic Product (GDP) and foreign exchange profits (NNPC, 2023). Nigeria ranks among the top ten oil-producing nations globally and is the leading producer in Africa. The sector substantially contributes to government revenues, accounting for over 80% of overall export earnings and about 40% of federal government revenue (CBN, 2022). Despite its strategic significance, the sector is hindered by numerous challenges that have constrained its growth. These include obsolete infrastructure, regulatory volatility, environmental degradation, security risks, and intensified competition from renewable energy sources. An increasing comprehension in this evolving landscape recognises digital transformation as a strategic instrument for addressing challenges and enhancing the efficiency, sustainability, and competitiveness of operations.

Digital transformation denotes the integration of digital technology across all facets of corporate operations, culture, and customer experiences, emerging as a primary catalyst for innovation and success across industries (Vial, 2019). It involves not just acquiring new technologies but also transforming the attitude, procedures, and organisational structure to align with contemporary market demands. Organisations are currently adopting technologies such as cloud computing, artificial intelligence (AI), big data analytics, machine learning, blockchain, and the Internet of Things (IoT) to enhance workflow efficiency, improve decision-making, and optimise resource utilisation (Deloitte, 2021). In the oil and gas business, digital transformation has enabled real-time monitoring of production systems, predictive maintenance, automated drilling, and enhanced security measures, resulting in decreased costs and increased performance metrics. Globally, stakeholders in the energy sector are swiftly investing in digital projects to maintain competitiveness in an evolving landscape. Multinational oil corporations such as Shell, Chevron, and BP have implemented digital twin technology, AI-driven reservoir modelling, and smart field technologies to enhance exploration and production efficiencies (McKinsey, 2022). These technologies provide more accurate forecasting, less downtime, and enhanced responsiveness to fluctuating market conditions. Furthermore, digital transformation streamlines distant operations, which became critically important following the global pandemic, as minimising human exposure to hazardous environments is essential. The oil and gas business in Nigeria has commenced a gradual progression towards digital transformation relative to its global competitors. Indigenous and global companies in the country have initiated digital projects aimed at improving operational efficiency, compliance, and stakeholder engagement processes. The scope and effectiveness of these transitions, however, vary

significantly and are contingent upon numerous factors, including infrastructural constraints, inadequate technical expertise, resistance to change, and inconsistent policy frameworks (Oyelola & Adekola, 2022). Furthermore, a widening chasm exists in comprehending the impact of these changes on worker dynamics, particularly regarding employee engagement and productivity—two critical elements that determine the success or failure of any digital endeavour. Employee engagement refers to the emotional commitment and involvement that employee has towards an organisation and its goals (Shuck & Wollard, 2010). Motivated individuals tend to exceed their job requirements, demonstrate loyalty, and positively influence organisational results. The productivity of employees denotes the efficiency with which workers convert resources into goods and services (OECD, 2021). Both conceptions are essential for organisational performance and depend on several internal and external elements, including leadership style, work environment, technology tools, and change management strategies.

Despite the implementation of digital transformation projects by many Nigerian oil and gas businesses, the anticipated results of enhanced staff engagement and productivity have not been consistently achieved (Alshawi et al., 2020). This contradiction suggests that while technology adoption is increasing, its execution often neglects the human element, particularly the psychological and behavioural responses of employees to change. Digital transformation involves not just the adoption of new tools but also the alteration of organisational culture, work processes, and employee interactions with technology (Vial, 2019). A lack of this comprehensive perspective results in uncertainty, resistance, and employee disengagement, ultimately diminishing the productivity that organisations aimed to achieve. Moreover, there exists a notable deficiency of localised research about the effects of digital transformation on workforce performance, specifically within the Nigerian oil and gas sector (Oyelola & Adekola, 2022). The majority of research on digital transformation and its impact on employees originates from Western or developed economies, where the infrastructure, legal framework, and workforce dynamics significantly differ from those in Nigeria, the case study economy. As a result, organisations risk adopting technologies without assessing their alignment with employees' local needs, skill levels, or organisational objectives (Singh & Metri, 2019). This gap can lead to less adoption, decreased user happiness, and thus worse ROI on digital investments.

The Nigerian oil and gas industry operates under a distinctive socio-economic and political context that influences the adoption and application of digital technology. The inconsistent power supply and inadequate Internet access are significant infrastructural deficiencies that impede digital integration. Moreover, convoluted legislation and bureaucratic obstacles may impede or even hinder digital initiatives, diminishing employee morale and enthusiasm.

While extensive literature connects digitisation with employee performance in developed economies, empirical research on this relationship within the Nigerian context remains limited. Most present research focus on financial or operational outcomes, with minimal emphasis given to the psychological and behavioural effects of digital transformation on employees (Alshawi et al., 2020). The knowledge gap is particularly evident in the oil and gas sectors, where the workforce is highly specialised and resistant to rapid change due to established operating cultures and strict hierarchical structures. These contextual elements necessitate a localised approach when conducting studies on the impact of digital transformation on employee engagement and productivity.

Research Objectives

1. To assess the current level of digital transformation in selected oil and gas firms in Nigeria.
2. To examine the relationship between digital transformation and employee engagement.
3. To evaluate the impact of digital transformation on employee productivity.
4. To identify factors that influence the effectiveness of digital transformation in enhancing employee outcomes.

LITERATURE REVIEW

Digital Transformation

Digital transformation is the integration of digital technologies across all corporate areas, significantly changing operational methods and value creation (Vial, 2019). It involves not just the use of technology but also the re-engineering of organisational processes, culture, and customer experience to align with evolving market demands. Digital transformation is a strategic alteration in which organisations implement emerging technologies, including artificial intelligence (AI), cloud computing, big data analytics, and the Internet of Things (IoT), to enhance productivity, facilitate informed decision-making, and encourage innovation (Deloitte, 2021).

The concept of digital transformation has evolved over time. Initially, it was regarded as the automation of manual tasks or the digitalisation of information systems. However, modern perspectives emphasise its impact on organisational strategy, leadership, and human capital. According to Vial (2019), digital transformation is not merely the use of new tools but also the cultivation of a digital-first mindset across the organisation.

Digital transformation is increasingly being adopted in the Nigerian oil and gas sector in response to global trends, regulatory mandates, and operational inefficiencies. International corporations operating in Nigeria, including as Shell, Chevron, and TotalEnergies, are commencing the implementation of digital solutions, including real-time monitoring systems, predictive maintenance algorithms, and smart field technologies, to optimise production and mitigate operational risks (NNPC, 2023). These initiatives seek to enhance safety, minimise downtimes, and promote environmental sustainability—an aspect of significant significance in an industry sometimes criticised for its ecological impact.

Nonetheless, despite several efforts, the pace and extent of digital transformation in the Nigerian oil and gas sector remain inconsistent. Many indigenous enterprises lack the infrastructure resources, skilled personnel, and strategic foresight to properly capitalise on digital opportunities (Oyelola & Adekola, 2022). Moreover, there is a scarcity of empirical evidence elucidating the impact of digital transformation on worker dynamics, particularly on employee engagement and productivity; a gap that the current research seeks to address.

Employee Engagement

Employee engagement refers to the emotional commitment an employee has to the organisation and its objectives (Shuck & Wollard, 2010). Such employees are inclined to exceed their obligations, demonstrate discretionary effort, and exhibit loyalty to the organisation. In contrast to job satisfaction, which primarily concerns employees' contentment with their roles, engagement represents a profound connection to the organization's goal and values.

Numerous elements influence involvement, including leadership style, corporate culture, communication techniques, recognition systems, and work-life balance. In the context of digital transformation, the notion of engagement becomes increasingly complex: employees must adapt to novel work methodologies, acquire unfamiliar technologies, and navigate organisational changes (Singh & Metri, 2019). A poorly managed digital transition can lead to disorientation, anxiety, and disengagement. Conversely, when employees are effectively guided, educated, engaged, and informed through inclusive decision-making and transparent communication, digital transformation can enhance their sense of empowerment and motivation.

Numerous studies have demonstrated that engagement significantly influences organisational performance. Deloitte (2021) noted that a digitally mature organisation exhibits higher employee satisfaction due to enhanced cooperation, flexibility, and access to real-time information. Alshawi et al. (2020) observed that digital transformation positively influences employee performance, contingent upon adequate training and leadership.

In Nigeria's oil and gas sector, employee engagement remains a critical issue due to the significant stakes and the necessity for continuous skill enhancement. Personnel in this sector are typically deployed in remote and hazardous locations, necessitating a high degree of motivation and resolve. Consequently, enhancing engagement via digital efforts may aid in talent retention, diminish attrition, and elevate operational effectiveness (Oyelola & Adekola, 2022).

Moreover, employee engagement is crucial in change management. Resistance to digital transformation is a significant issue, particularly in sectors with entrenched operational cultures. Singh and Metri (2019) asserted that resistance to change in the digital realm is typically linked to insufficient skills, unclear communication, and inadequate involvement in decision-making. While it may appear straightforward, involving employees in the design and development of digital tools not only fosters commitment but also mitigates resistance to change and cultivates a culture of continual improvement.

Feedback mechanisms are a crucial component of employee engagement in the context of digital transformation. Regular feedback mechanisms allow employees to express their concerns, offer solutions, and feel acknowledged, which is essential for psychological safety and confidence. Companies that actively solicit and address employee feedback have higher engagement levels during the digital transition process (Shuck & Wollard, 2010).

Moreover, engagement is intrinsically linked to organisational identity and purpose. Engaged employees perceive that their contributions influence the overarching objectives of the organisation. Digital transformation can enhance this relationship by providing employees with access to performance indicators for real-time monitoring of progress and cross-functional collaboration (OECD, 2021).

Employee Productivity

Productivity assesses the efficiency of output relative to input (OECD, 2021). The work environment demonstrates the efficiency with which employees transform resources into commodities and services. Elevated productivity levels indicate enhanced profitability, improved service delivery, and a stronger competitive advantage. Productivity is often measured by measures such as output rate per unit of time and profit per individual; however, qualitative factors like motivation, skill level, and work environment all significantly impact productivity.

Productivity enhancements are frequently cited as a primary objective of digital transformation. The tools for automation, data analytics, and workflow optimisation are designed to eliminate redundancies, reduce errors, and expedite task completion (Vial, 2019). The extent of benefits obtained is contingent upon the integration of digital technologies into daily operations and the training of personnel in their utilisation. Empirical study confirms a positive association between digital transformation and productivity. Alshawi et al. (2020) found that the execution of digital projects in UAE banks yielded measurable improvements in people performance, bolstered by leadership and structured training programs. Deloitte (2021) indicated that digitally mature organisations had greater productivity due to streamlined operations and enhanced access to information.

Productivity is a crucial metric of performance in Nigeria's oil and gas business, due to the sector's capital-intensive characteristics and the intricacies inherent in its operations. Companies strive to achieve optimal output at minimal costs, particularly in the current climate of fluctuating oil prices and increasing demand to adopt sustainable practices. The digital transformation facilitates the achievement of these objectives through real-time monitoring, predictive maintenance, and data-driven decision-making (NNPC, 2023). AI-driven drilling systems enhance precision and save downtime, while IoT-enabled sensors monitor equipment health to prevent catastrophic failures. Cloud-based technologies facilitate seamless collaboration among geographically dispersed teams of engineers and technicians, enabling timely sharing of insights and resolution of challenges (Deloitte, 2021).

Despite the aforementioned advantages of digital transformation, its effect on productivity is not inherent. Numerous obstacles may impede growth, including insufficient technological skills, inadequate

internet connectivity, and resistance to change. Oyelola and Adekola (2022) observed the lack of localised research regarding the influence of digital tools on operational performance in Nigeria; thus, several companies may implement these technologies without understanding their applicability and efficacy.

Moreover, technology is not the sole determinant of productivity, as it is influenced by organisational policy and human resource practices. Training programs, incentive structures, and performance rating systems significantly influence employee behaviour and performance (OECD, 2021). Therefore, to realise the complete potential of digital transformation, the HR strategies of Nigerian oil and gas firms must align with digital transformation initiatives.

An effective method to achieve this is by incorporating productivity-enhancing features directly into digital platforms. For instance, utilising dashboards to display individual and team performance indicators can encourage staff to meet expectations and identify areas for improvement (OECD, 2021). Gamification features that enhance morale and performance may include recognition badges or accomplishment awards.

The establishment of a continuous learning environment is crucial for sustained productivity improvements. Employees should be motivated to enhance their skills and remain informed about developing technologies pertinent to their roles. This can be achieved through collaboration with educational institutions, organisational training programs, and digital learning systems tailored to the requirements of the oil and gas sector (Alshawi et al., 2020).

Empirical Review

Numerous studies investigate the relationship between digital transformation and worker outcomes, offering insights into how the integration of digital technologies affects employee performance, engagement, and satisfaction. According to Alshawi et al. (2020), digital transformation significantly enhances employee performance, and its efficacy is further augmented by appropriate training and supporting leadership. Their research conducted in the banking sector of the United Arab Emirates revealed that the effective integration of digital technologies was significantly correlated with the employees' readiness to utilise them. This underscores the necessity for investment not just in technological infrastructure but also in the development of human capital through focused learning and change management initiatives.

Similarly, Singh and Metri (2019) emphasised that opposition to digital change arises from two primary factors. Deficiency in skills and ambiguity in communicating. Employees will exhibit greater resistance to changes when they lack a comprehensive understanding of new systems regarding their purpose and functionality. In numerous instances, organisations deploy digital technologies without engaging employees in the design and implementation phases, resulting in uncertainty, anxiety, and inadequate uptake. The authors assert that transparent and consistent communication throughout the transformation process is essential for reducing uncertainty and fostering a culture of acceptance and creativity.

Deloitte (2021) concluded that technologically mature organisations exhibit higher employee satisfaction due to enhanced cohesion, flexibility, and the usage of real-time data. Such organisations are inclined to utilise electronic platforms that facilitate seamless communication, distant work arrangements, and enhanced decision-making processes. This approach enhances employee empowerment and fosters a stronger connection to the organization's objectives. Deloitte observed that these advantages are primarily evident in developed economies, where digital ecosystems are more advanced and aligned with contemporary workplace practices.

Despite the increasing literature on digital transformation and its impact on employees, the majority of research has been undertaken in industrialised nations, such as those in North America, Europe, and certain regions of Asia. They typically possess robust digital infrastructures, significant regulatory frameworks, and high levels of digital literacy, facilitating the effective implementation of digital

programs. In contrast, there is a notable deficiency of localised research regarding the applicability of these results to growing economies like Nigeria, particularly in vital areas such as the oil and gas industry (Oyelola & Adekola, 2022).

Technology Acceptance Model (TAM)

The technologies Acceptance Model (TAM), proposed by Davis in 1989, is a foundational theory that elucidates how individuals come to embrace and adopt new technologies. The Technology Acceptance Model posits that perceived usefulness and perceived ease of use affect individuals' attitudes towards system utilisation, therefore influencing actual usage behaviour. Perceived usefulness refers to the extent to which an individual believes that utilising a specific system would enhance their job performance, whereas perceived ease of use indicates the degree to which a system is considered effortless to learn or operate.

The Technology Acceptance Model (TAM) is an effective approach for assessing the impact of digital transformation on employee engagement. If digital systems are perceived as user-friendly and advantageous, employees are likely to experience empowerment, a sense of connection to their work, emotional commitment, and discretionary effort (Shuck & Wollard, 2010). Consequently, they should not only seek to acquire modern technologies but also invest in change management tactics that enhance users' perceptions of the systems.

This paradigm has been extensively utilised in many organisational contexts to comprehend device responses to technological development (Venkatesh & Davis, 2000). In the Nigerian oil and gas sector, where digital transformation projects are more prevalent, the significance of TAM cannot be overstated. Digital technologies, including remote monitoring systems, enterprise resource planning (ERP) applications, and cloud-based systems, are effective only when workers perceive them as beneficial to their everyday tasks, without adding unnecessary complexity and burden (Vial, 2019).

Transformational Leadership Theory

The transformational leadership theory proposed by Bass (1985) is relevant in the context of digital transformation. This idea emphasises the significance of visionary leadership in effectuating organisational change. Transformational leaders possess the capacity to articulate a distinct digital vision, stimulate innovation, and enable personnel to surmount the obstacles of transition (Northouse, 2016). Unlike transactional leadership, which focusses on routine compliance and reward-punishment mechanisms, transformational leadership fosters motivation and empowerment by aligning individual objectives with broader organisational goals.

Researchers have determined that leadership transformation favourably influences employee satisfaction, innovation, and productivity, which are outcomes associated with success in digital transformation (Bass, 1985). Northouse, 2016. Deloitte (2021) indicated that digitally mature organisations have more employee satisfaction due to improved cooperation and flexibility, facilitated by effective, digitally-oriented leadership.

The success of digital transformation initiatives in the Nigerian oil and gas industry frequently hinges on leadership style and the capacity to implement change successfully, given the prevalence of hierarchical leadership structures (Oyelola & Adekola, 2022). Effective leadership that articulates the rationale behind digital initiatives, engages employees in decision-making, and provides ongoing support during implementation is likely to foster high levels of employee buy-in and engagement.

METHODOLOGY

A quantitative study design using a cross-sectional survey method was employed. This approach enables for testing hypotheses and discovering trends at a specific moment in time. The population consist of all individuals operating in managerial and technical roles across selected oil and gas corporations in Nigeria. A sample size of 300 respondents was selected using the Cochran formula at a 95% confidence level and 5% margin of error.

Data was acquired using standardised questionnaires delivered to employees of selected companies. Likert-scale items examined digital transformation, employee engagement, and productivity. Data was analyzed using Statistical Package for Social Sciences (SPSS) and SmartPLS for structural equation modeling (SEM). Descriptive statistics, correlation analysis, and regression testing were used to assess the hypotheses.

RESULTS AND DISCUSSION

Descriptive Statistics

VARIABLE	MEAN	STD. DEVIATION
Digital Transformation	4.12	0.78
Employee Engagement	3.95	0.82
Employee Productivity	4.01	0.75

Means indicate generally positive perceptions of digital transformation and its impact on engagement and productivity.

Correlation Matrix

VARIABLES	DT	EE	EP
Digital Transformation (DT)	1		
Employee Engagement (EE)	0.62**	1	
Employee Productivity (EP)	0.58**	0.65**	1

* $p < 0.01$

Positive correlations suggest digital transformation is associated with higher engagement and productivity.

Regression Analysis

Hypothesis 1: DT → Employee Engagement

- $\beta = 0.54, p < 0.01 \Rightarrow$ Supported

Hypothesis 2: DT → Employee Productivity

- $\beta = 0.49, p < 0.01 \Rightarrow$ Supported

These findings confirm that digital transformation has a statistically significant positive effect on both employee engagement and productivity.

CONCLUSION AND RECOMMENDATIONS

This study reveals that digital transformation has a vital influence in shaping employee engagement and productivity in the Nigerian oil and gas industry. Companies that invest in digital tools alongside staff training and assistance likely to achieve greater worker outcomes.

However, the following are the recommendations;

1. Invest in Training and Development: Equip personnel with the skills needed to utilise digital tools efficiently.
2. Promote Change Management Programs: Help staff adjust to new systems through clear communication and leadership support.
3. Monitor Employee Feedback: Use surveys and feedback loops to understand the psychological and behavioral implications of digital efforts.
4. Align Digital Strategies with HR Policies: Ensure that digital transformation supports employee well-being and professional progression.
5. Encourage Innovation and Participation: Involve employees in the design and implementation of digital projects to enhance buy-in.

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