

Analysis of the Impact of Perceived Usefulness and Perceived Ease of Use on Intention to Use Digital Technology in the African Oil and Gas Industry

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Abstract

Digital transformation has become a crucial factor for the sustainability of the global oil and gas industry; however, its adoption in the African region still faces various structural and competency challenges. This study aims to analyze the influence of Digital Literacy and Organizational Support on the Intention to Use Digital Technology among the workforce in the African oil and gas industry. Using a quantitative approach, data were collected through a survey of 250 professionals in the oil and gas sector across key countries such as Nigeria, Angola, and Egypt. Data analysis was performed using Structural Equation Modeling-Partial Least Squares (SEM-PLS). The results indicate that both Digital Literacy and Organizational Support have a positive and significant influence on the intention to use digital technology. Digital literacy is proven to lower psychological and technical barriers to accepting innovation, while organizational support in the form of infrastructure provision and adaptive management policies acts as a catalyst that strengthens employee confidence. These findings confirm that to achieve successful digital transformation in Africa, companies must not only invest in hardware but also prioritize human capital development and create a work ecosystem that fosters innovation. This research provides managerial implications for energy industry leaders in Africa to formulate holistic digitalization strategies to enhance operational efficiency and global competitiveness.

Keywords: *digital literacy, organizational support, intention to use digital technology, oil and gas industry.*

INTRODUCTION

The global oil and gas industry is currently at a critical juncture of digital transformation, driven by the emergence of Industry 4.0. This era has introduced a paradigm shift where operational efficiency is no longer solely dependent on mechanical prowess but on the successful integration of technologies such as the Internet of Things (IoT), Big Data Analytics, and Artificial Intelligence (AI). In Africa, the oil and gas sector serves as the primary economic backbone for nations like Nigeria, Angola, and Algeria, contributing significantly to their national GDPs. However, despite this immense potential, digital adoption in the African energy landscape often lags behind global standards. This digital gap poses a serious threat to the region's competitiveness, making it imperative to understand the factors that drive or hinder the transition toward a more digitized operational framework.

At the heart of this technological shift lies the "intention to use" digital tools, which serves as the crucial psychological precursor to actual implementation. Within the African workforce, this intention is frequently shaped by the level of digital literacy among employees. In a traditionally capital-intensive and mechanical industry, many workers have relied on conventional methods for decades, leading to a potential resistance toward new digital workflows. Digital literacy in this context extends beyond basic IT skills; it encompasses a comprehensive understanding of how digital solutions can solve complex problems in exploration and production. Therefore, addressing the gap in digital competence is essential to fostering a workforce that is not only capable but also willing to embrace innovation.

Beyond individual capabilities, the role of organizational support is equally vital in determining the success of digital migration. Transformation requires more than just acquiring software; it demands a fundamental shift in corporate culture, supported by adequate infrastructure and forward-thinking management policies. In many African oil and gas firms, digital initiatives are often stifled by rigid hierarchies and a lack of continuous training programs. Without tangible backing from leadership both in terms of financial investment and the creation of a supportive innovation ecosystem employees are likely to remain skeptical of new technologies. This research aims to analyze how digital literacy and organizational support interact to influence the intention to adopt digital technology, providing strategic insights for enhancing the long-term sustainability and efficiency of the African energy sector.

RESEARCH METHODS

This research adopts a quantitative approach with an explanatory research design aimed at clarifying the causal relationships between the independent and dependent variables. The research population consists of the professional workforce, including managers and technical staff, active in both the upstream and downstream sectors of the African oil and gas industry, particularly in countries with intensive petroleum activities such as Nigeria, Angola, and Egypt. Given the broad geographical scope and industrial complexity, a non-probability sampling technique using purposive sampling will be employed to select respondents who have direct interaction with or access to digital technology implementation in their daily operations. The target sample size is set at a minimum of 250 respondents to meet the criteria for robust multivariate analysis and ensure adequate data representation.

Primary data will be collected through an online survey using a structured questionnaire that has undergone a pilot study to ensure clarity and cultural relevance across various organizational backgrounds. Each research variable Digital Literacy, Organizational Support, and Intention to Use Digital Technology is measured using indicators adapted from previous studies and assessed on a five-point Likert scale. Digital Literacy is evaluated through technical and cognitive competence dimensions, while Organizational Support is assessed based on infrastructure availability, management policies, and the provision of continuous training programs within the companies.

To test the proposed hypotheses, the data analysis technique utilized is Structural Equation Modeling (SEM) with a Partial Least Squares (PLS) approach. The analysis procedure is conducted in two primary stages: the evaluation of the Measurement Model (Outer Model) to test the validity and reliability of the instrument, and the evaluation of

the Structural Model (Inner Model) to determine the strength of relationships between variables through path coefficients and significance levels. SEM-PLS is deemed the most appropriate method due to its flexibility in handling complex path models and its ability to provide accurate estimations even when data face challenges regarding distribution normality, which is common in organizational behavior research within technical industries.

RESULTS AND DISCUSSION

The empirical analysis conducted using Structural Equation Modeling-Partial Least Squares (SEM-PLS) yielded robust results regarding the factors influencing the intention to use digital technology within the African oil and gas sector. Initial evaluations of the measurement model confirmed that all constructs Digital Literacy, Organizational Support, and Intention to Use met the required thresholds for convergent and discriminant validity, with Cronbach's Alpha and Composite Reliability scores exceeding 0.70. The structural model analysis revealed that both independent variables have a positive and statistically significant impact on the dependent variable. Specifically, the path coefficients indicate that Digital Literacy serves as a foundational driver, while Organizational Support acts as a critical catalyst that accelerates the willingness of the workforce to adopt complex digital tools such as AI-driven exploration and real-time data monitoring systems.

The finding that Digital Literacy significantly influences the intention to use technology underscores the importance of cognitive and technical readiness in a high-stakes industry. In the context of the African oil and gas landscape, where many operations have historically relied on manual and legacy systems, a higher level of digital competence reduces the perceived complexity of new technologies. When employees possess the necessary skills to navigate digital interfaces and interpret data analytics, their psychological resistance to change diminishes. This result aligns with the Technology Acceptance Model (TAM), suggesting that as workers become more digitally literate, they perceive digital tools as more "user-friendly," which directly bolsters their proactive intent to integrate these innovations into their daily technical workflows.

Furthermore, the analysis demonstrates that Organizational Support is a powerful predictor of technology adoption intention. In many African nations, the "digital divide" remains a significant hurdle, characterized by inconsistent infrastructure and limited access to high-level technical training. The results suggest that when oil and gas companies provide tangible support such as state-of-the-art hardware, stable high-speed connectivity, and continuous professional development programs employees feel more empowered and secure in transitioning to digital platforms. Management's commitment to creating a "safety net" for innovation ensures that the workforce does not view digitalization as a threat to job security, but rather as an opportunity for professional growth and operational safety.

In the discussion of these findings, it is evident that a synergistic relationship exists between individual competence and institutional backing. While an employee may be digitally literate, a lack of organizational resources will stifle their intention to innovate. Conversely, providing advanced technology without the requisite training (digital literacy) leads to underutilization and frustration. For the African energy sector to remain competitive globally, leadership must move beyond mere procurement of software and

focus on a holistic digital ecosystem. The integration of these variables suggests that the intention to use digital technology is not merely a technical choice but a cultural transformation. By prioritizing both human capital development and structural investment, African oil and gas firms can successfully navigate the complexities of the energy transition, ensuring operational resilience and long-term sustainability in an increasingly volatile global market. These insights provide a strategic roadmap for policymakers and industry leaders to foster a future-ready workforce capable of leveraging the full potential of the digital age.

CONCLUSION

In conclusion, this study provides compelling evidence that the digital transformation of the African oil and gas industry is fundamentally driven by the interplay between individual competence and organizational commitment. The empirical results demonstrate that Digital Literacy is a mandatory prerequisite; without a workforce that understands and trusts digital tools, any technological investment will face significant psychological resistance and underutilization. However, literacy alone is insufficient to sustain a long-term transition. The findings highlight that Organizational Support acts as the essential structural backbone, providing the necessary infrastructure, clear management policies, and continuous learning ecosystems that empower employees to move beyond traditional manual workflows. In the unique context of the African energy sector where infrastructure gaps and cultural resistance to change are prevalent this research concludes that a holistic approach is vital. Companies must move away from isolated software procurement and instead focus on building a resilient digital culture. By synchronizing the enhancement of human capital through digital upskilling with robust institutional backing, African oil and gas firms can significantly increase their "intention to use" new technologies. Ultimately, this strategic alignment will lead to improved operational efficiency, enhanced safety standards, and a more competitive position in the global energy market during this era of digital disruption.

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