Research Journal of Business and Finance
Vol. 5 No. 1 (2026): ISSN (Online): 2958-8634
DOI: https://doi.org/10.58721/74ppp430
Digital Infrastructure Development, Organisational Agility, and Perceived Competitive Advantage: Evidence from Telecommunication Firms in South Sudan

Digital Infrastructure Development, Organisational Agility, and Perceived Competitive Advantage: Evidence from Telecommunication Firms in South Sudan

Athuai Rehan & Paul Katuse
United States International University – Africa, Kenya

Article History
Received: 10.01.2026
Revised: 06.06.2026
Accepted: 10.06.2026
Published: 20.06.2026

Keywords
Cloud computing
Connectivity
Digital infrastructure
Network

How to cite:
Rehan, A., & Katuse, P. (2026). Digital Infrastructure Development, Organisational Agility, and Perceived Competitive Advantage: Evidence from Telecommunication Firms in South Sudan. *Research Journal of Business and Finance*, 5(1), 192-205.

Abstract
The study sought to examine the effect of digital infrastructure development and organisational agility on the perceived competitive advantage of telecommunication firms in South Sudan. The study was based on positivist philosophy that informed the adoption of a cross-sectional research design. The study targeted 148 employees drawn from management, and technical levels of each of the 11 telecommunication firms operating in South Sudan. Thereafter, a sample of 108 respondents was determined using Yamane's 1967 formula before proportionate stratified sampling was adopted to ensure each staff category was represented in line with its population share. The achieved response rate was 85.2% (n= 92). Structured questionnaires were adopted in sourcing data before analysis was undertaken with the aid of the Statistical Package for the Social Sciences. The regression analysis revealed that digital infrastructure development was significantly associated with perceived competitive advantage of firms. However, the effect of organisational agility and interaction between digital infrastructure development and organisational agility were not significant. The study thus concluded that digital infrastructure development was positively associated with the perceived competitive advantage of telecommunication firms in South Sudan. These findings underscore the importance of digital infrastructure development as a strategic pathway toward competitiveness in telecommunication firms in South Sudan.

Introduction
The global economy is increasingly being shaped by digital transformation, which has fundamentally altered the sources of firm competitiveness across industries (Verhoef et al., 2021). In the telecommunications sector, digital technologies have transformed traditional competitive dynamics by shifting emphasis from physical network expansion and pricing strategies toward digital infrastructure capabilities, innovation, customer experience, and organisational responsiveness (Porter, 1985; Matt et al., 2015; Barney & Hesterly, 2019; Barasa & Ngure, 2025). Digital infrastructure development, encompassing broadband networks, fibre-optic systems, data centres, cloud platforms, and advanced mobile technologies, has become a critical strategic resource through which telecommunication firms create and sustain competitive advantage (ITU, 2021; Verhoef et al., 2021). At the same time, organisational agility, the ability of firms to rapidly sense environmental changes and respond effectively through adaptive decision-making and resource reconfiguration, has emerged as a crucial capability for exploiting digital investments and maintaining market relevance

in turbulent environments (Teece et al., 2016; Troise et al., 2022). Despite these developments, telecommunication firms operating in fragile and post-conflict economies continue to experience substantial challenges in translating digital infrastructure investments into superior competitive outcomes (World Bank, 2024). South Sudan exemplifies this challenge, characterised by low internet penetration, limited broadband infrastructure, inadequate digital connectivity, high operational costs, and persistent institutional constraints that undermine industry competitiveness (ITU, 2023). Consequently, while digital infrastructure is increasingly recognised as a driver of competitiveness, there remains a limited understanding of how it contributes to competitive advantage within telecommunication firms operating under conditions of infrastructural deficits, market uncertainty, and institutional fragility.

Studies conducted in developed and emerging economies demonstrate that investments in digital infrastructure enhance operational efficiency, innovation capability, service quality, and customer satisfaction, thereby strengthening competitive advantage (Queiroz et al., 2020; Shehade et al., 2023; Kola, 2023; Talaja et al., 2023; Du et al., 2025). In addition, studies have highlighted the role of organisational agility in enabling firms to respond rapidly to market changes, technological disruptions, and evolving customer needs, thereby enhancing organisational performance and competitiveness (Troise et al., 2022; Nguyen et al., 2020). Despite these contributions, the existing literature exhibits several limitations. First, much of the empirical evidence originates from technologically advanced and institutionally stable environments, limiting the generalisability of findings to fragile, resource-constrained, and post-conflict economies such as South Sudan. Second, studies have often examined digital infrastructure development and organisational agility in isolation from each other, with limited attention to their simultaneous contribution to competitive advantage within a single analytical framework. This knowledge gap is particularly evident in South Sudan's telecommunications sector, where digital transformation efforts coexist with infrastructural, institutional, and market constraints. Therefore, empirical investigation is necessary to establish how digital infrastructure development and organisational agility influence competitive advantage in this context.

This study addressed the identified gap by examining the effect of digital infrastructure development and organisational agility on perceived competitive advantage among telecommunication firms in South Sudan. The study was grounded in the Resource-Based View (RBV) (Barney, 1991), which argues that firms achieve sustained competitive advantage through resources that are valuable, rare, inimitable, and non-substitutable (VRIN). Digital infrastructure capabilities constitute such strategic resources because they improve organisational effectiveness and are difficult to imitate owing to their dependence on firm-specific investments, proprietary knowledge, and established operational routines. Digital infrastructure was expected to generate value through improved service delivery and operational efficiency, while remaining rare due to uneven infrastructure endowment across firms and regions in South Sudan. It was also imperfectly imitable because replication requires substantial capital investment, time, and path-dependent technological accumulation, and non-substitutable because alternative resources cannot easily replicate integrated network and systems capabilities. Drawing on Dynamic Capabilities Theory (Teece et al., 2016; Teece et al., 1997), organisational agility represents a firm's capacity to sense environmental changes, rapidly reconfigure resources, and respond effectively to emerging opportunities and threats. In highly dynamic telecommunications markets, agile firms are better positioned to adapt service offerings, implement technological innovations, address customer needs promptly, and respond to regulatory and competitive changes. Through these mechanisms, organisational agility enhances responsiveness, innovation, and service quality, thereby strengthening competitive advantage. The focus on South Sudan is motivated by the

country's unique combination of digital infrastructure deficits, evolving telecommunications markets, and institutional challenges, which provide a distinctive setting for extending existing theory and empirical knowledge. Thus, the study offers context-specific evidence on digital competitiveness in fragile economies and offers practical insights for managers, policymakers, and industry stakeholders. The research tested the following hypotheses:

H_{O1}: Digital infrastructure development has no significant effect on the perceived competitive advantage of telecommunication firms in South Sudan.

H_{O2}: Organisational agility has no significant effect on the perceived competitive advantage of telecommunication firms in South Sudan.

H_{O3}: The interaction between digital infrastructure development and organisational agility has no significant effect on the perceived competitive advantage of telecommunication firms in South Sudan.

Methods

Research Design, Target Population and Sampling

A positivist philosophy was adopted to examine the effects of digital transformation on perceived competitive advantage through objective, measurable indicators and statistical analysis (Creswell & Creswell, 2022). This approach supports hypothesis testing and generalisation, while minimising bias. The positivist philosophy informed the adoption of a cross-sectional research design to capture data from multiple respondents from telecommunication firms at a single point in time, enabling assessment of relationships between digital infrastructure, organisational agility and perceived competitive advantage (Saunders et al., 2022). The study targeted all 148 management (board, executive, departmental, and middle management) and technical staff from the 11 active telecommunication firms in South Sudan (National Communication Authority [NCA], 2025). The telecommunication firms constituted the organisational context of the study within which respondents were nested. Therefore, data were collected from individual respondents and analysed at the individual level. Measures of digital infrastructure, organisational agility, and perceived competitive advantage reflect respondents' perceptions of organisational conditions and outcomes. A sample of 108 respondents was determined using Yamane's (1967) formula at a 5% margin of error, providing a statistically adequate representation of the finite population. Proportionate stratified sampling was adopted to ensure each staff category was represented in line with its population share, enhancing representativeness and reducing sampling bias (Saunders et al., 2022). Within each stratum, simple random sampling was applied to ensure equal selection probability and strengthen internal validity (Table 1).

Table 1: Proportionate stratified sampling

Category	Population	Sample Selected
Board representatives	33	33/148*108= 24
CEO/COO	16	16/148*108= 12
Departmental heads	33	33/148*108=24
Middle-level managers	33	33/148*108=24
Technical staff	33	33 /148*108=24
Total	**148**	**108**

CEO= Chief executive officer, COO= chief commercial officer

Data Collection and Analysis

Data for this study were collected using a structured, self-administered questionnaire designed to capture quantitative responses from employees of telecommunication firms in South Sudan. The instrument comprised predominantly closed-ended questions measured on a five-point Likert-scale

(1 = Strongly Disagree to 5 = Strongly Agree). The questionnaire was organised into thematic sections covering digital infrastructure development, organisational agility, and perceived competitive advantage. This structure ensured systematic measurement of all study constructs using standardised indicators. Before full deployment, a pilot study was conducted involving 11 respondents drawn from three telecommunication firms, representing approximately 10% of the intended sample. These participants, who were excluded from the final study, included management, technical staff, and customer service personnel. The pilot exercise assessed clarity, timing, and feasibility of the instrument, leading to confirmation of its adequacy without major revisions. Reliability testing using Cronbach's Alpha confirmed acceptable internal consistency across all constructs: digital infrastructure development (0.756), organisational agility (0.778) and perceived competitive advantage (0.765) exceeding the 0.70 threshold recommended in social science research (Field, 2023). The Average Variance Extracted (AVE) were computed based on standardised factor loadings obtained from confirmatory factor analysis (CFA), using the Fornell–Larcker procedure, where AVE is calculated as the mean of squared standardised loadings for each construct. All constructs exhibited satisfactory convergent validity, as AVE values exceeded 0.50 threshold: digital infrastructure development (AVE = 0.617), organisational agility (AVE = 0.571), and perceived competitive advantage (AVE = 0.665) as presented in Table 2.

Table 2: Factor Loading and The Average Variance Extracted

Construct	Item	λ	λ²	Item	λ	λ²	Item	λ	λ²
Digital Infrastructure Development (AVE = 0.617)	DID1	0.80	0.640	DID7	0.78	0.608	DID13	0.76	0.578
	DID2	0.78	0.608	DID8	0.76	0.578	DID14	0.83	0.689
	DID3	0.76	0.578	DID9	0.83	0.689	DID15	0.80	0.640
	DID4	0.83	0.689	DID10	0.80	0.640	DID16	0.79	0.624
	DID5	0.80	0.640	DID11	0.79	0.624	DID17	0.78	0.608
	DID6	0.79	0.624	DID12	0.78	0.608	DID18	0.81	0.656
Organisational Agility (AVE = 0.571)	OA1	0.75	0.563	OA7	0.73	0.533	OA7	0.73	0.533
	OA2	0.75	0.563	OA8	0.73	0.533			
	OA3	0.76	0.578	OA9	0.78	0.608			
	OA4	0.76	0.578	OA10	0.78	0.608			
	OA5	0.75	0.563	OA11	0.75	0.563			
	OA6	0.76	0.578	OA12	0.76	0.578			
Perceived Competitive Advantage (AVE = 0.665)	PCA1	0.82	0.672	PCA7	0.82	0.672	PCA13	0.82	0.672
	PCA2	0.83	0.689	PCA8	0.81	0.656	PCA14	0.81	0.656
	PCA3	0.81	0.656	PCA9	0.83	0.689	PCA15	0.83	0.689
	PCA4	0.82	0.672	PCA10	0.82	0.672	PCA16	0.82	0.672
	PCA5	0.83	0.689	PCA11	0.81	0.656	PCA17	0.81	0.656
	PCA6	0.81	0.656	PCA12	0.83	0.689	PCA18	0.82	0.672

Data analysis was conducted using SPSS version 23. Descriptive statistics (means and standard deviations) were first generated to summarise respondent characteristics and variable distributions. Before regression-based interpretations, diagnostic tests for normality, linearity, homoscedasticity, and multicollinearity were undertaken to ensure statistical assumptions were satisfied. Multiple regression analysis was employed to test the null hypotheses as given in equation 1.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_1 * X_2 + \varepsilon$$

Where: Y = Perceived Competitive advantage, β0 = Constant term, β_1, β_2, = Regression coefficients, X_1 = Digital infrastructure development, ε = Random error term, X_2 = Organisational agility, $X_1 * X_2$ is the product of x1 and x2 capturing the interaction between digital infrastructure development and

organisational agility. The decision to reject or fail to reject the null hypotheses was based on the p-value associated with the regression coefficients. A significance level of 0.05 was used as the threshold for hypothesis testing. If the p-value was less than 0.05, the null hypothesis was rejected, indicating a statistically significant relationship or effect. Conversely, if the p-value was greater than or equal to 0.05, the null hypothesis failed to be rejected, suggesting insufficient evidence to conclude a significant relationship or effect. Ethical clearance was obtained from the Institutional Review Board of the United States International University (USIU). Informed consent, confidentiality, anonymity, and voluntary participation were strictly upheld throughout the study, with secure data handling procedures implemented to protect respondent information.

Results

A total of 92 questionnaires were completed and returned from the 108 issued. As such, the study achieved a high response rate of 85.2% (n=92) and generally considered sufficient to ensure reliability and representativeness in survey research (Creswell & Creswell, 2022). The high response was due to follow-up reminders and the engagement of respondents from different levels of management and technical staff. The high response implies that the findings are adequately representative of the target population and enhances the validity of subsequent descriptive and inferential analyses.

Demographic Characteristics of Respondents

Table 3 presents the demographic characteristics of the respondents in terms of education level, job position, and tenure within their respective telecommunication firms. Regarding educational attainment, the findings indicate that the majority of respondents possessed relatively high levels of education. Nearly half (48.91%) held a bachelor's degree, while 30.43% had master's degrees. Diploma holders accounted for 16.30%, whereas respondents with doctoral qualifications represented 4.35%. Therefore, more than 83% of the respondents possessed at least a bachelor's degree. The distribution of respondents by job position further strengthens the credibility of the findings. Middle-level managers constituted the largest proportion of respondents (26.09%), followed by technical staff (23.91%), departmental heads (21.74%), board representatives (19.57%), and CEOs/COOs (8.70%). This distribution ensured representation from both strategic and operational levels of the organisations. The findings on tenure revealed that respondents who had served between 7 and 10 years constituted the largest group (32.61%), followed by those with more than 10 years of service (20.65%). Those with 4–6 years and 1–3 years of service accounted for 21.74% and 19.57%, respectively, while only 5.43% had worked for less than one year. Thus, more than three-quarters of the respondents had served in their organisations for at least four years.

Table 3: Demographic Characteristics of respondents

Variable	Category	Frequency	Percentage (%)
Level of Education	College Diploma	15	16.30
	Bachelor's Degree	45	48.91
	Master's Degree	28	30.43
	Doctoral Degree	4	4.35
Job Position	Board Representatives	18	19.57
	CEO/COO	8	8.70
	Departmental Heads	20	21.74
	Middle-Level Managers	24	26.09
	Technical Staff	22	23.91
Length of Service (Tenure)	Less than 1 year	5	5.43
	1–3 years	18	19.57
	4–6 years	20	21.74
	7–10 years	30	32.61
	More than 10 years	19	20.65

Descriptive Statistical Analysis

The results presented in Table 4 summarise respondents' perceptions of competitive advantage across three dimensions: perceived market position, perceived product differentiation, and perceived market responsiveness. The findings indicate a generally high perceived market position among respondents, with mean scores ranging from 4.08 to 4.27. The highest-rated item was the perception that the firm consistently outperforms competitors in customer satisfaction surveys (M = 4.27, SD = 0.59). This was closely followed by perceptions that the firm's pricing strategy offers superior value to customers compared to competitors (M = 4.17, SD = 0.66) and that the firm holds a strong market share in its primary industry segment (M = 4.15, SD = 0.57). Respondents also indicated strong agreement that the firm enjoys higher customer loyalty than competitors (M = 4.11, SD = 0.62) and that customers recognise the firm as a sector leader (M = 4.10, SD = 0.56). The lowest, though still relatively high, perception concerned the firm's positioning among top-tier industry players (M = 4.08, SD = 0.70). The overall mean score of 4.15 (SD = 0.26) suggests a consistently strong perceived market position across respondents. Regarding perceived product differentiation, respondents similarly reported high levels of agreement, with item means ranging between 4.08 and 4.21. The strongest perception was that the firm's products or services are distinct from competitors (M = 4.21, SD = 0.64). This was followed by the view that the firm continuously introduces innovative features and enhancements (M = 4.18, SD = 0.61) and that customer feedback is actively used to develop differentiated offerings (M = 4.16, SD = 0.54). Respondents also agreed that digital technologies are leveraged to create unique offerings (M = 4.12, SD = 0.68) and that customers perceive products as superior to alternatives in the market (M = 4.10, SD = 0.63). The lowest-rated item, though still positive, was the perception that the firm maintains a reputation for high-quality and innovative products or services (M = 4.08, SD = 0.63). The composite mean of 4.14 (SD = 0.27) indicates a strong overall perception of product differentiation. In terms of perceived market responsiveness, respondents again expressed high agreement across all items, with means ranging from 4.09 to 4.24. The highest-rated perception was that the firm collaborates effectively with external partners to enhance responsiveness (M = 4.24, SD = 0.58), followed closely by the ability to anticipate and respond to market trends and customer preference shifts (M = 4.23, SD = 0.63). Respondents also perceived that the firm is faster than competitors in introducing new offerings (M = 4.13, SD = 0.60) and that it responds quickly to changing customer needs (M = 4.10, SD = 0.66). Additional agreement was observed regarding the use of data analytics to anticipate emerging needs (M = 4.09, SD = 0.57) and continuous updating of products and services (M = 4.09, SD = 0.59). The overall mean score of 4.14 (SD = 0.22) reflects a consistently strong perception of market responsiveness.

Table 4: Descriptive Statistics for Perceived Competitive Advantage

Statement (n =92_	Mean	SD
Perceived Market Position		
I perceive that my company consistently outperforms competitors in customer satisfaction surveys.	4.27	0.59
I perceive that my company's pricing strategy provides better value for customers compared to competitors.	4.17	0.66
I perceive that my company holds a strong market share in its primary industry segment.	4.15	0.57
I perceive that my company has a high level of customer loyalty compared to competitors.	4.11	0.62
I perceive that customers recognise my company's brand as a leader in the telecommunications sector.	4.10	0.56
I perceive that my firm is often considered in the top-tier by industry analysts and customers.	4.08	0.70
Overall Score for Perceived Market Position	**4.15**	**0.26**
Perceived Product Differentiation		
I perceive that my company's products or services are unique compared to those of competitors.	4.21	0.64
I perceive that my company continuously introduces innovative features and enhancements to its products or services.	4.18	0.61
I perceive that my company uses customer feedback to develop differentiated products or services.	4.16	0.54
I perceive that my company leverages digital technologies to create unique product or service offerings.	4.12	0.68
I perceive that customers view our products or services as superior and more valuable than alternatives in the market.	4.10	0.63
I perceive that my company has a reputation for delivering high-quality and innovative products or services.	4.08	0.63
Overall Score for Perceived Product Differentiation	**4.14**	**0.27**
Perceived Market Responsiveness		
I perceive that my company collaborates with external partners to enhance market responsiveness.	4.24	0.58
I perceive that my company has a strong ability to anticipate and respond to market trends and shifts in customer preferences.	4.23	0.63
I perceive that, compared to competitors, my company is faster in bringing new offerings to the market.	4.13	0.60
I perceive that my company is quick to introduce new products or services in response to changing customer needs.	4.10	0.66
I perceive that my company uses data analytics to predict and respond to emerging customer needs.	4.09	0.57
I perceive that my company frequently updates and enhances existing products or services to meet evolving market demands.	4.09	0.59
Overall Score for Perceived Market Responsiveness	**4.14**	**0.22**

Table 5 presents descriptive statistics on digital infrastructure development among telecommunication firms in South Sudan, operationalised through network connectivity, cloud computing usage, and digital tool integration. Network connectivity recorded a strong composite mean (M = 4.09, SD = 0.26), suggesting that firms generally perceive their network systems as reliable and effective. High ratings were observed for seamless stakeholder communication (M = 4.15, SD = 0.61), adequate internet speed (M = 4.10, SD = 0.63), and continuous investment in network upgrades (M = 4.09, SD = 0.64). Additional indicators confirm stability in peak usage periods (M = 4.08, SD = 0.63) and adequate service coverage (M = 4.07, SD = 0.63), reflecting infrastructural robustness. Cloud computing usage also showed a high composite mean (M = 4.07, SD = 0.25), indicating widespread adoption of cloud-based systems. Key strengths include operational scalability (M = 4.12, SD = 0.57), collaborative efficiency (M = 4.11, SD = 0.54), and improved organisational performance (M = 4.07, SD = 0.61). Firms also reported strong data security practices (M = 4.05, SD = 0.50) and extensive use of cloud-hosted applications (M = 4.05, SD = 0.50), though full-scale data migration remained slightly

lower (M = 4.00, SD = 0.70). Digital tool integration recorded the highest overall mean (M = 4.15, SD = 0.23), indicating extensive adoption across organisational processes. Key outcomes include enhanced productivity (M = 4.24, SD = 0.62), cross-departmental usage (M = 4.21, SD = 0.58), and improved service delivery and cost efficiency. Continuous training (M = 4.08, SD = 0.60) and structured implementation strategies (M = 4.08, SD = 0.68) further support effective integration.

Table 5: Descriptive Statistics for Digital Infrastructure Development

Statement (n= 92)	Mean	SD
Network Connectivity		
Our company's network infrastructure supports seamless communication with stakeholders such as customers, suppliers, regulators and employees	4.15	0.61
Our company's network infrastructure provides internet speed that adequately supports my work demands	4.10	0.63
Our company invests in regular upgrades to network infrastructure to meet growing digital demands	4.09	0.64
During peak usage times, the network performance remains stable, allowing consistent work productivity	4.08	0.63
I find the network reliability within our company to be sufficient for maintaining continuous service when performing important tasks	4.08	0.6
The network coverage across our company's facilities allows me to work effectively from any location within the premises	4.07	0.63
Overall Score for Network Connectivity	4.09	0.26
Cloud Computing Usage		
Cloud computing has enabled our company to scale operations	4.12	0.57
My team frequently uses cloud-based tools for collaboration and project management	4.11	0.54
Adoption of cloud computing has significantly increased the efficiency of operations in the company	4.07	0.61
Our company has implemented robust security measures to protect data stored on cloud platforms	4.05	0.5
Our critical business applications are predominantly hosted on cloud platforms	4.05	0.5
A significant portion of our company's data is stored and managed using cloud services	4.00	0.7
Overall Score for Cloud Computing Usage	4.07	0.25
Integration of Digital Tools		
The digital tools provided are well-suited to enhance productivity in my specific job role	4.24	0.62
Digital tools and technologies are widely adopted across different departments within our company	4.21	0.58
Our company actively promotes the use of new digital technologies to improve service delivery	4.17	0.55
The integration of digital tools has reduced operational costs in our company	4.14	0.53
Employees receive regular training to effectively use the digital tools integrated into our workflows	4.08	0.6
Our company has a well-defined strategy for integrating digital tools in business processes	4.08	0.68
Overall Score for Integration of Digital Tools	4.15	0.23

The descriptive statistics (Table 6) indicate that telecommunication firms in South Sudan exhibit relatively high levels of organisational agility, reflected in the overall mean scores for flexibility in resource allocation (M = 4.00, SD = 0.25) and innovation culture (M = 3.995, SD = 0.236). Respondents generally agreed that their organisations possess agile characteristics that support adaptation to changing market conditions and operational challenges. Regarding resource flexibility, respondents reported that their organisations have contingency plans for reallocating resources during disruptions (M = 4.07, SD = 0.55), empower employees to make timely decisions (M = 4.02, SD = 0.63), and allow

adjustments to priorities based on changing business needs (M = 4.02, SD = 0.66). Firms also utilise digital tools to optimise resource allocation in real time (M = 4.00, SD = 0.59). The low overall standard deviation indicates strong consensus among respondents. Similarly, the findings reveal a positive innovation culture. Respondents agreed that their organisations encourage experimentation and risk-taking (M = 4.04, SD = 0.57), promote learning from failed initiatives (M = 4.02, SD = 0.63), reward successful innovations (M = 4.01, SD = 0.73), and support innovative ideas across organisational levels (M = 3.99, SD = 0.67). Overall, the results suggest that flexible resource deployment and innovation-oriented practices are well established, enhancing firms' capacity to adapt, innovate, and remain competitive in dynamic environments.

Table 6: Descriptive Statistics for Organisational Agility

Statement (n=92)	Mean	SD
Flexibility in Resource Allocation		
Our company has contingency plans to reallocate resources during unexpected disruptions	4.07	0.55
Employees are empowered to make decisions and allocate resources promptly	4.02	0.63
Employees have the flexibility to adjust their priorities based on changing business needs	4.02	0.66
Our company uses digital tools to monitor and optimise resource allocation in real time	4.00	0.59
Our company can rapidly reallocate resources to address emerging needs or opportunities	3.99	0.67
Decision-making processes related to resource allocation are streamlined and efficient	3.94	0.68
Overall Score of Flexibility in Resource Allocation	4.00	0.25
Innovation culture		
There is a culture of experimentation and risk-taking within our company	4.04	0.57
Employees are encouraged to learn from failed experiments without fear of punishment	4.02	0.63
Our company celebrates and rewards successful innovations	4.01	0.73
Our company encourages innovative ideas from all levels of employees	3.99	0.67
Employees are given the freedom and resources to explore new and creative solutions	3.96	0.65
Our company uses pilot projects to test innovative ideas before full-scale implementation	3.95	0.56
Overall Score for Innovation Culture	3.995	0.236

Diagnostic Tests

Before conducting regression analysis, this study conducted diagnostic tests for normality, linearity, homoskedasticity, and multicollinearity before performing the final regression analysis. The Kolmogorov–Smirnov test confirmed that the variables were normally distributed with significance values being above the 0.05 level: digital infrastructure development (p = 0.200*), organisational agility (p = 0.176), interaction term (p= 0.112 and perceived competitive advantage (p= 0.200*). Moreover, the Shapiro–Wilk significance values range from 0.136 to 0.512, all of which exceed the recommended threshold of 0.05. The Breusch–Pagan test for heteroskedasticity indicated that the chi-square statistics was statistically insignificant at the 5% level ($\chi^2 = 2.84$, p = 0.417) suggesting that the variance of the error term is constant across all levels of the predictor variables. Further, the study tested for functional form misspecification using the Ramsey RESET test with the results showing the model was correctly specified (p = 0.255) confirming that there was no evidence of omitted nonlinear relationships or functional form misspecification in the models. Finally, the results showed that all Variance Inflation Factor values were below the critical threshold of 5: digital infrastructure development (1.61); organisational agility (1.72) and interaction term (1.41) indicating that

multicollinearity was not a concern. Therefore, the regression coefficients could be interpreted with confidence.

Regression Analysis

The regression results in Table 7 indicate that the model provides a moderate and statistically meaningful explanation of perceived competitive advantage among telecommunication firms. The model summary shows a correlation coefficient of R = 0.534, suggesting a moderate positive relationship between the predictors and perceived competitive advantage.

Table 7: Regression Analysis Output

Model Summary

Model	R	R Square	Adjusted R Square	SE of the Estimate
1	.534	.285	.262	0.679

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.450	3	2.150	11.684	.000
	Residual	16.230	88	0.184		
	Total	22.680	91			

Coefficients

Model	B	SE	β	t	Sig	95% CI for B
Constant	3.056	0.551		5.550	.000	[1.960, 4.152]
Digital Infrastructure Development (X_1)	0.321	0.096	0.342	3.340	.001	[0.130, 0.512]
Organisational Agility(X_2)	-0.058	0.087	-0.070	-0.665	.508	[-0.231, 0.115]
Interaction Term (X_1*X_2)	0.014	0.041	0.041	0.341	.734	[-0.067, 0.095]

$$Y = 3.056 + 0.321X_1 - 0.058X_2 + 0.014(X_1X_2) + \varepsilon$$

The coefficient of determination (R^2 = 0.285) implies that 28.5% of the variation in perceived competitive advantage is explained by Digital Infrastructure Development and Organisational Agility. The ANOVA results confirm that the overall regression model is statistically significant, with F = 11.684 and p< 0.01. This indicates that the combined effect of the independent variables significantly predicts perceived competitive advantage. Regarding the individual coefficients, Digital Infrastructure Development exhibits a positive and statistically significant effect on perceived competitive advantage (β_1 = 0.321, t = 3.340, p < 0.01). Therefore, *H_{O1}: Digital Infrastructure Development has no significant effect on the perceived competitive advantage of telecommunication firms in South Sudan* was rejected. In contrast. Organisational Agility showed a negative and statistically insignificant relationship with perceived competitive advantage (β_2 = -0.058, t = -0.665, p > 0.01). The null hypothesis (**H_{O2}):** *Organisational Agility has no significant effect on perceived competitive advantage of telecommunication firms in South Sudan* was not rejected. Finally, the effect of the interaction term on perceived competitive advantage was positive and statistically insignificant (β_3 = 0.014, t = 0.341, p > 0.01). Therefore, the null hypothesis (H_{O3}): *The interaction between digital infrastructure development and organisational agility has no significant effect on the perceived competitive advantage of telecommunication firms in South Sudan* was not rejected.

Discussion of Findings

The findings indicate that the development of digital infrastructure was significantly associated with perceived competitive advantage among telecommunication firms in South Sudan. This outcome

suggests that firms with more advanced, integrated, and reliable digital systems are better positioned in service delivery efficiency, operational efficiency, and market responsiveness. In structurally constrained and conflict-affected environments, such as South Sudan, digital infrastructure appears to function not merely as an operational tool but as a core strategic asset that enables firms to compensate for external inefficiencies in institutional and physical infrastructure. This result is consistent with empirical evidence from other emerging and developing markets. For example, Kola (2023) found that in Kenya's telecommunications sector, firms that invested in digital operational systems—such as automated customer management platforms and integrated network monitoring tools—recorded higher levels of competitiveness and service reliability. Similarly, Queiroz et al. (2020) demonstrated that digital infrastructure enhances strategic alignment between corporate and business-unit level activities, thereby improving organisational performance through improved coordination, data integration, and decision-making speed. In addition, studies by Mataruka et al. (2022) in Southern Africa reinforce the argument that foundational digital investments generate substantial performance gains even in resource-constrained environments, particularly where firms must rely on internal capabilities to overcome external inefficiencies. The present findings, therefore, extend this body of work by providing evidence from a conflict-affected economy, demonstrating that digital infrastructure retains its strategic value even under heightened political and institutional uncertainty. From a theoretical perspective, these results strongly support the Resource-Based View (RBV) advanced by Barney (1991), which posits that firms achieve sustained competitive advantage through resources that are valuable, rare, inimitable, and non-substitutable. In this context, digital infrastructure qualifies as a strategic resource because it enhances operational efficiency and is difficult for competitors to replicate quickly in fragile environments where capital constraints, technological gaps, and institutional instability persist. The findings further resonate with the Dynamic Capabilities Theory (Teece et al., 2016), which argues that firms must integrate, build, and reconfigure internal competencies to address rapidly changing environments. Digital infrastructure, in this sense, provides the sensing and coordinating foundation upon which dynamic capabilities can be activated, particularly in volatile markets.

In contrast, organisational agility exhibited a negative but statistically insignificant relationship with perceived competitive advantage. This finding suggests that, within South Sudan's telecommunications sector, agility does not independently translate into measurable competitive advantage gains when digital infrastructure is accounted for. This diverges from expectations in much of the agility literature, which often positions agility as a key determinant of competitiveness in dynamic environments. For instance, Zhang et al. (2023) and Nguyen et al. (2020) emphasise that organisational agility enhances responsiveness and innovation outcomes, particularly in technology-intensive industries. However, the present findings suggest that such benefits may be contingent on enabling infrastructural conditions. In environments where foundational digital systems are weak or unevenly distributed, agility may be constrained by operational bottlenecks, limiting its effectiveness as an independent perceived competitive advantage driver. Theoretically, this result challenges a simplified interpretation of Dynamic Capabilities Theory by suggesting that sensing and reconfiguration abilities alone are insufficient without strong underlying resource platforms. In other words, while dynamic capabilities such as agility are conceptually important, their effectiveness appears to be structurally dependent on the presence of robust digital infrastructure. This aligns with recent extensions of RBV and dynamic capability literature that emphasise the hierarchy of capabilities, where foundational technological assets enable higher-order organisational routines. Furthermore, the interaction effect between digital infrastructure development and organisational agility was found to be statistically insignificant, indicating that agility does not significantly moderate the relationship between digital infrastructure and perceived competitive advantage. This suggests

that the perceived competitive advantage benefits of digital infrastructure are relatively direct and stable, rather than contingent on the firm's level of operational flexibility. In practical terms, this implies that once a certain threshold of digital infrastructure is achieved, its contribution to competitive advantage becomes structurally embedded and less dependent on managerial or behavioural adaptability. This finding contrasts with studies in more mature markets, where agility often amplifies the benefits of technological infrastructure. For example, research in European and Asian telecom markets frequently shows that firms with both strong digital systems and high agility outperform those with either capability alone. The divergence observed in this study is likely attributable to contextual constraints in South Sudan, where infrastructural deficits, regulatory unpredictability, and limited technological diffusion reduce the marginal impact of agility. Therefore, the results suggest a hierarchical capability structure in which digital infrastructure functions as a foundational determinant of competitive advantage, while organisational agility plays a secondary or conditional role. This reinforces the argument that in emerging and fragile economies, firm competitive advantage is driven first by the establishment of stable technological infrastructure before more advanced dynamic capabilities can meaningfully influence outcomes.

Even though the study was successfully undertaken, a few limitations exist. First, the explanatory power of the model is moderate, with an adjusted R^2 of 0.262. This indicates that 73.8% of the variation in perceived competitive advantage is not captured by the included predictors. This points to omitted variable bias, where other potentially important determinants such as market competition intensity, firm size, leadership capability, innovation capacity, or regulatory environment were not included in the model, potentially limiting the completeness of the explanation. Second, the study relies on cross-sectional data, which limits the ability to draw causal inferences. While the regression results show statistical associations between digital infrastructure development, organisational agility, and perceived competitive advantage, they do not establish temporal ordering or causality. As a result, it cannot be conclusively stated that improvements in digital infrastructure led to increased perceived competitive advantage, since reverse or bidirectional relationships may also be possible. Third, the findings may be subject to self-reporting bias given that the data were collected using structured questionnaires and Likert-scale items, as is common in similar studies. Respondents may overestimate or underestimate aspects such as digital infrastructure quality or organisational agility due to perception bias or organisational image concerns. Further, although respondents reported high levels of resource allocation flexibility and innovative culture as measures of organisational agility, the findings should be interpreted with caution. Organisational agility is widely recognised as a multidimensional construct encompassing environmental sensing, rapid decision-making, and resource reconfiguration capabilities (Teece, 2007; Doz & Kosonen, 2010). The present study focused primarily on resource flexibility and innovation culture which represent important but not exhaustive aspects of agility. Consequently, the non-significant effect of organisational agility on competitive advantage may partly reflect the narrower operationalisation adopted in the study rather than the absence of a substantive relationship. Additionally, because responses were collected anonymously without firm identifiers, the study could not account for potential clustering effects or assess within-firm agreement. Consequently, findings should be interpreted as reflecting employee perceptions of organisational attributes rather than objective firm-level measures of digital infrastructure, organisational agility, and perceived competitive advantage. Finally, it is important to acknowledge that the constructs in this study exhibit restricted variance, which mechanically limits the amount of statistical explanation that can be achieved in the model. This restriction of range can attenuate correlation coefficients and depress the achievable R^2, thereby placing an upper bound on the explanatory power of the regression model even when theoretically relevant relationships exist.

Consequently, the reported coefficients should be interpreted as conservative estimates of the true associations among constructs.

Conclusion

The study sought to examine the effect of digital infrastructure and organisational agility on perceived competitive advantage among telecommunication firms in South Sudan**.** The study concluded that digital infrastructure development was positively associated with perceived competitive advantage among telecommunications firms in South Sudan, while organisational agility does not exert a significant direct or moderating influence. The findings reinforce the strategic importance of digital infrastructure development as a foundational resource for competitive advantage in emerging markets such as South Sudan. However, the limited effect of organisational agility suggests that its value may be context-dependent and potentially constrained by structural and infrastructural limitations within the sector. Overall, the results highlight that investments in digital infrastructure are more critical for firm competitiveness than organisational agility alone in the South Sudanese telecommunications environment. These findings underscore the importance of strengthening digital infrastructure investments as a strategic pathway toward enhancing competitiveness in telecommunication firms in South Sudan. Managers in telecommunication firms in South Sudan should prioritise a major digital infrastructure upgrade. Further, regulatory support is needed for ICT development and other enabling conditions that may allow organisational agility to more effectively translate into competitive advantage gains in the future for all firms. Future research should incorporate broader agility dimensions to provide a more comprehensive assessment of organisational agility within telecommunication firms.

References

Barasa, D., & Ngure, K. Digital communication across cultures. In: Nesi, H., Milin, P. (Eds.), *International Encyclopedia of Language and Linguistics, 3e.* Vol. 6, pp. 375-378. Elsevier. https://dx.doi.org/10.1016/B978-0-323-95504-1.00640-2.

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, *17*(1), 99-120. https://doi.org/10.1177/014920639101700108

Barney, J. B., & Hesterly, W. S. (2019). *Strategic management and competitive advantage: Concepts and cases* (6th ed.). Pearson.

Creswell, J. W., & Creswell, J. D. (2022). *Research design: Qualitative, quantitative, and mixed methods approaches* (6th ed.). SAGE Publications.

Doz, Y. L., & Kosonen, M. (2010). Embedding strategic agility: A leadership agenda for accelerating business model renewal. *Long range planning*, *43*(2-3), 370-382.

Du, X., Wang, N., Lu, S., Zhang, A., & Tsai, S. B. (2025). Sustainable competitive advantage under digital transformation: an eco-strategy perspective. *Chinese Management Studies*, *19*(3), 758-782. https://doi.org/10.1108/CMS-01-2024-0077

Field, A. (2023). *Discovering statistics using IBM SPSS Statistics* (6th ed.). Sage Publications.

Global System for Mobile Communications Association (2024). *Connectivity for refugees: South Sudan Country profile.* https://www.gsma.com/solutions-and-impact/connectivity-for-good/mobile-for-development/wp-content/uploads/2024/05/Connectivity-for-Refugees_SouthSudan_R2_Web.pdf

International Telecommunication Union (2021). *Digital trends in Europe 2021-ICT trends and developments in Europe, 2017-2020.* https://www.itu.int/pub/D-IND-DIG_TRENDS_EUR.01

International Telecommunication Union (2023). *Measuring digital development.* https://www.itu.int/dms_pub/itu-d/opb/ind/d-ind-ict_mdd-2023-1-pdf-e.pdf

Kola, J. (2023). *Effect of digital transformation on competitive advantage of telecommunication firms in Kenya.* Master's Thesis, United States International University-Africa, Nairobi. https://erepo.usiu.ac.ke/handle/11732/7661

Matt, C., Hess, T., & Benlian, A. (2015). Digital transformation strategies. *Business & information systems engineering, 57*(5), 339-343. https://doi.org/10.1007/s12599-015-0401-5

National Communication Authority (NCA), South Sudan. (2025). Publications and regulatory reports on telecommunications sector. https://www.nca.gov.ss/publications

Nguyen, D. K., Broekhuizen, T., Dong, J. Q., & Verhoef, P. C. (2020). When it takes three to tango in the digital transformation age: Synergies between digital orientation, change commitment and organisational agility. *ICIS 2020 Proceedings.*

Porter, M. E. (1985). Competitive advantage: Creating and sustaining superior performance. Free Press

Queiroz, M., Tallon, P., Coltman, T., & Sharma, R. (2020). Digital infrastructure, business unit competitiveness, and firm performance growth: The moderating effects of business unit IT autonomy. *Proceedings of the 53rd Hawaii International Conference on System Sciences.* https://doi.org/10.24251/HICSS.2020.693

Saunders, M. N. K., Lewis, P., & Thornhill, A. (2022). *Research methods for business students* (9th ed.). Pearson.

Shehade, M., Atta, A., Barrak, T., Lutfi, A., & Alrawad, M. (2023). Digital transformation: An empirical analysis of operational efficiency, customer experience, and competitive advantage in Jordanian Islamic banks. *Uncertain Supply Chain Management*, *12*(2), 695-708.

Talaja, A., Škokić, V., & Mise, N. (2023). Organisational change capability and ambidexterity: The mediating role of innovativeness and responsiveness. *Cogent Business & Management*, *10*(3), 2279380. https://doi.org/10.1080/23311975.2023.2279380

Teece, D., Peteraf, M., & Leih, S. (2016). Dynamic capabilities and organisational agility: Risk, uncertainty, and strategy in the innovation economy. California management review, 58(4), 13-35. https://doi.org/10.1525/cmr.2016.58.4.13

Teece, D. J. (2007). Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance. Strategic management journal, 28(13), 1319-1350.

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, *18*(7), 509-533.

Troise, C., Corvello, V., Ghobadian, A., & O'Regan, N. (2022). How can SMEs successfully navigate a VUCA environment: The role of agility in the digital transformation era. *Technological Forecasting and Social Change*, *174*, 121227. https://doi.org/10.1016/j.techfore.2021.121227

Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J. Q., Fabian, N., & Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. *Journal of Business Research, 122* (1), 889-901. https://doi.org/10.1016/j.jbusres.2019.09.022

World Bank (2024). *Digital economy for Africa.* https://thedocs.worldbank.org/en/doc/61714f214ed04bcd6e9623ad0e215897-0400012021/related/Digital-Economy-RepSudan-jun22.pdf

Yamane, T. (1967). *Statistics: An introductory analysis (2nd ed.)*. Harper & Row.

Zhang, H., Ding, H., & Xiao, J. (2023). How organisational agility promotes digital transformation: An empirical study. *Sustainability*, *15*(14), 11304. https://doi.org/10.3390/su151411304