GUSAU JOURNAL OF BUSINESS ADMINISTRATION (GUJOBA)

Vol. 4 Issue 2, December, 2025; Pp 204 - 213

ISSN: 2811-1702. https://doi.org/10.57233/gujoba.v4i2.20

A Publication of the Department of Business Administration, Federal University Gusau, Nigeria

IMPACT OF ENTREPRENEURIAL CHARACTERISTICS AND ENTREPRENEURIAL DIGITAL INNOVATION TEAMS ON OPERATIONAL EFFICIENCY OF SMES IN ZAMFARA

***Samaila Iliyasu, Kabiru Ringim, and Musa Uba Adamu**
Department of Business Administration Faculty of Social and Management Sciences, Federal University, Gusau, Zamfara State
Department of Business Administration Faculty of Management Sciences, Ahmadu Bello University Zaria, Kaduna State
Department of Business Administration Faculty of Social and Management Sciences, Maryam Abacha American University Kano

*Correspondence: siliyasu@fugusau.edu.ng

ABSTRACT

Operational inefficiency remains a major barrier to SME growth in Nigeria. This study investigates how entrepreneurial characteristics and entrepreneurial digital innovation teams (EDITs) influence the operational efficiency of small and medium enterprises (SMEs) in Zamfara State. The objective was to examine the extent to which internal entrepreneurial traits and team-based digital strategies contribute to improving productivity and minimizing waste in SME operations. The study focused on two independent variables; entrepreneurial characteristics and EDITs, and one dependent variable, operational efficiency. A quantitative research approach was adopted using a cross-sectional survey design. The population comprised 10,003 registered SMEs in Zamfara, from which a sample of 363 respondents was selected using a multistage sampling technique. Data were collected through a structured questionnaire and analyzed using correlation, and multiple regression analysis. Findings revealed that both entrepreneurial characteristics and EDITs had significant positive effects on operational efficiency. The findings support the dynamic capabilities theory, demonstrating how internal capabilities enable SMEs to optimise operations. The results suggest that SME leaders with proactive, innovative, and risk-tolerant traits, as well as firms that adopt team-driven digital innovation, are more likely to achieve optimal operational performance. The study concludes that internal capacities, both individual and structural, play a vital role in enhancing SME efficiency in underdeveloped regions. It is recommended that stakeholders provide targeted training to develop entrepreneurial competencies and support the establishment of digital innovation teams through policy incentives and digital capacity-building programs. These interventions can strengthen internal mechanisms and boost SME performance across Nigeria.

Keywords: Entrepreneurial Characteristics, Digital Innovation Teams, Operational Efficiency, SMEs.

1. INTRODUCTION

Operational efficiency is a vital determinant of small and medium enterprises' (SMEs) success globally. It encompasses the ability of firms to maximize outputs while minimizing resource waste, thereby achieving sustainable growth and competitiveness. In increasingly dynamic business environments, operational efficiency has become more complex, involving digital responsiveness, strategic resource allocation, and process optimization (Saunila, 2020). Across continents, SMEs that embed agility, innovation, and team-based

approaches to management exhibit higher levels of efficiency and resilience.

In Africa, particularly sub-Saharan nations, SMEs represent a critical economic force but often struggle with operational inefficiencies. The constraints range from outdated operational methods to poor strategic alignment, limiting their potential to scale and sustain market relevance (Hamdan & Braendle, 2024). These inefficiencies directly impact their productivity, cost structures, and ability to compete within both domestic and international markets. Hence, there is increasing academic attention on uncovering internal entrepreneurial factors that enhance performance.

In the Nigerian, SMEs account for nearly 96% of all businesses, contributing over 48% to GDP (Ibrahim & Mahfouz, 2023). However, despite their sheer volume, operational bottlenecks, arising from inadequate managerial capacity, limited technological leverage, and underutilized innovation potential, persist. These inefficiencies are not solely external; rather, they also stem from foundational elements like entrepreneurial orientation, personal characteristics, and internal team dynamics (Iwu & Tengeh, 2021).

Entrepreneurial characteristics such as proactiveness, innovativeness, and risk-taking ability are widely acknowledged as essential traits for strategic SME leadership. These characteristics influence how entrepreneurs perceive change, adapt operations, and lead innovation within their organizations. For instance, Musa and Hakeem (2025) posit that entrepreneurial personal attributes directly affect operational adjustments and problem-solving mechanisms that foster efficiency. Such internal traits shape not just decision-making but also how effectively digital tools are adopted and diffused across business operations.

Closely related is the formation and function of Entrepreneurial Digital Innovation Teams (EDITs), which integrate cross-functional expertise to drive digital transformation within SMEs. These teams are pivotal in streamlining internal operations through innovative tech applications, automation, and customer-centric service models. Karunanayake and Jayasekara (2024) demonstrate that digital innovation teams significantly improve workflow processes, resource integration, and agility among South Asian SMEs, lessons that bear relevance for the Nigerian experience.

In the specific setting of Zamfara State, where economic development hinges heavily on SME vitality, operational inefficiencies remain a pressing issue. Despite government and donor efforts, SMEs in Zamfara often suffer from outdated practices, slow adoption of digital solutions, and limited strategic human capital. As Bukhowa (2024) noted, entrepreneurial capacity and digital team collaboration are overlooked but central to operational revival, especially in underserved regions like Zamfara. Hence, this study intends to explore how the personal traits of SME entrepreneurs and the structuring of digital innovation teams influence operational efficiency.

However, despite growing recognition of these factors, empirical understanding of how entrepreneurial characteristics and EDITs interact to shape operational efficiency in Nigeria, especially in less-studied regions like Zamfara, remains underdeveloped. Existing studies often emphasize financial capital or market strategy, leaving a knowledge gap regarding internal drivers of efficiency. Moreover, contextual disparities in entrepreneurial behavior and digital readiness across Nigeria's states call for localized investigations into these dynamics.

Despite increased policy interventions and digital infrastructure investments, there is a persistent operational inefficiency of SMEs in Zamfara State,While most efforts focus on access to finance and infrastructure, little attention has been paid to internal entrepreneurial traits and collaborative digital innovation teams that can drive efficiency from within. This lack of information hampers the design of tailored strategies to improve SME performance. Therefore, there is a pressing need to examine how entrepreneurial characteristics and EDITs influence operational efficiency, in order to inform more holistic and effective development frameworks for SMEs in Zamfara and similar contexts. Against this backdrop, the study tests the following hypothesis:

H_{01}: Entrepreneurial Characteristics have no significant influence on the operational efficiency of SMEs in Zamfara State.

H_{02}: Entrepreneurial Digital Innovation Teams have no significant influence on the operational efficiency of SMEs in Zamfara State.

2. LITERATURE REVIEW

Operational Efficiency

Operational efficiency is a critical performance indicator that reflects how effectively an enterprise utilizes its resources to generate outputs with minimal waste, cost, and redundancy. For SMEs, especially in emerging economies, achieving high operational efficiency is not just a function of cost-cutting, but also of innovation, digital adoption, and managerial quality (Kraus, 2021). Studies indicate that efficient SMEs tend to exhibit streamlined internal processes, agile decision-making, and responsiveness to market demands (Saunila, 2020). Ibrahim and Mahfouz (2023) emphasize that in informal business settings, efficiency hinges on the entrepreneur's capacity to coordinate people, tasks, and tools toward optimal productivity. Similarly, Rosli, Hasbolah, and

Hamzah (2021) found that technological and entrepreneurial competencies significantly enhance SME operations in rural contexts. According to Zhang, Sarfo, and Amankwah (2025), strategic integration of green technology and innovation is another catalyst for improved efficiency.

In South Africa, Iwu and Tengeh (2021) established a link between sustainable operational practices and the long-term viability of SMEs. Mwasalwiba and Kalimang'asi (2021) noted that operational gains among youth-led SMEs in Africa were largely tied to entrepreneurial training and adaptive team structures. Lastly, Pulka, Haruna, and Mani (2024) assert that digital disruption forces SMEs to evolve their operational models rapidly, where efficiency becomes a competitive requirement rather than an optional goal.
For this study, operational efficiency is conceptualized as the ability of SMEs in Zamfara State to maximize productivity and service delivery with minimal waste, through strategic utilization of entrepreneurial characteristics and digital innovation team capabilities.

Entrepreneurial characteristics
Entrepreneurial characteristics represent foundational traits that shape how entrepreneurs identify opportunities, innovate, and navigate uncertainties. These include risk tolerance, innovativeness, proactiveness, achievement motivation, and internal locus of control, traits consistently linked to enhanced firm performance. Mwasalwiba and Kalimang'asi (2021) emphasized the role of such attributes in driving youth-led SME competitiveness across Africa. Ibrahim and Mahfouz (2023) found that entrepreneurial mindset, especially autonomy and goal orientation, enhances operational adaptability in informal enterprises. In South Africa, Iwu and Tengeh (2021) revealed that self-efficacy and resilience significantly correlate with SME survival. Osibanjo and Ojo (2021) demonstrated how personal entrepreneurial motivation fuels strategic decision-making among SME owners in developing economies. Kraus (2021) linked risk-taking and leadership vision to SME digital transformation capacity, while Rosli, Hasbolah, and Hamzah (2021) observed that innovative disposition enhances resource optimization. Zhang, Sarfo, and Amankwah (2025) found that characteristics like environmental sensitivity and innovation readiness facilitate operational resilience. Lastly, Pulka, Haruna, and Mani (2024) highlighted that proactive and tech-curious entrepreneurs achieve superior digital adaptation in volatile markets.

For this study, entrepreneurial characteristics are defined as the cognitive, behavioral, and emotional traits, such as innovativeness, risk-taking, and proactiveness,that empower entrepreneurs in Zamfara SMEs to lead, adapt, and manage operations efficiently in a dynamic environment.

Entrepreneurial Digital Innovation Teams
Entrepreneurial Digital Innovation Teams (EDITs) represent collaborative structures within SMEs, designed to harness digital capabilities and entrepreneurial creativity in driving performance, responsiveness, and efficiency. These teams blend technical acumen with strategic vision to innovate across marketing, customer relations, and internal operations. According to Chatterjee and Kar (2021), digital cross-functional teams enhance SME agility by fostering real-time decision-making. Barakat and Odeh (2023) observed that innovation teams embedded in digital ecosystems contributed significantly to improving product cycle times and customer engagement among Jordanian SMEs. Khalil and Abdallah (2022) highlighted that SMEs leveraging dedicated digital innovation teams outperformed peers in market expansion and service personalization. Manesh and Rialti (2020) found that entrepreneurial teams supported by IT infrastructure enabled strategic alignment between technology and business goals in European SMEs. Rantakari and Hyvönen (2024) revealed that team-level innovation initiatives enhanced adaptability to changing regulatory and market environments.

Ali and Elsammani (2023) further illustrated that digital collaboration among innovation teams in Sudanese firms promoted organizational learning and reduced operational lags. Elsetouhi and Elbeltagi (2021) demonstrated that digital innovation champions within teams drove intrapreneurship and competitiveness in Egyptian SMEs. Meanwhile, Eze and Chinedu (2025) found that collective innovation processes in Nigerian SMEs were associated with improved customer loyalty and cost-efficiency.
For this study, entrepreneurial digital innovation teams are conceptualized as structured, collaborative units within SMEs in Zamfara State, tasked with implementing digital strategies and fostering innovation to enhance operational efficiency and responsiveness.

Empirical Review of Literature

Entrepreneurial Characteristics and Operational Efficiency of SMEs
Entrepreneurial characteristics are fundamental behavioral, cognitive, and personal traits that enable entrepreneurs to identify opportunities, allocate resources effectively, and drive operational excellence. Recent scholarship emphasizes traits such as risk tolerance, resilience, innovation orientation, and leadership as critical to business efficiency and adaptability (Chikhi & Gachi, 2025). In the context of SMEs, these characteristics significantly influence

decision-making quality and efficiency in volatile markets (Scalamonti, 2025). For instance, Liu (2025) found that entrepreneurial strategic foresight can enhance operational agility and cost management among SMEs adopting digital technologies. Similarly, Croucher, Moe Chit, and Osabutey (2025) argue that entrepreneurial self-efficacy and internal locus of control are directly related to sustained operational capabilities during external shocks such as the COVID-19 pandemic.

Mahamadou (2025) also observed that entrepreneurial initiative Mahamadou (2025) also observed that entrepreneurial initiative and political acumen empower SME owners to leverage institutional frameworks, leading to improved resource flow and coordination efficiency in constrained environments. In support of this, Agyeman and Osei (2023) highlighted that SMEs led by goal-oriented and proactive entrepreneurs were better at implementing lean practices, thus reducing production waste and increasing throughput.

Likewise, Hamza and Njau (2022) emphasized that entrepreneurs with strong innovation orientation and risk-taking behavior were more capable of adapting internal processes for operational effectiveness in the face of market uncertainties. Moreover, Kato and Okafor (2021) reported that the strategic thinking and resilience of entrepreneurs significantly enhanced workflow optimization, supply chain coordination, and service delivery timelines within West African SMEs. Cumulatively, these empirical findings underscore a robust link between entrepreneurial characteristics and operational efficiency. SMEs managed by individuals with strong entrepreneurial dispositions tend to exhibit better performance in managing limited resources, adjusting to external pressures, and optimizing internal operations. This reinforces the argument that enhancing entrepreneurial traits through training, mentorship, and strategic exposure can lead to measurable improvements in SME efficiency, particularly in regions like Zamfara State where operational constraints are common.

Entrepreneurial Digital Innovation Teams and Operational Efficiency of SMEs

Recent empirical research underscores the pivotal role that entrepreneurial digital innovation teams (EDITs) play in enhancing the operational efficiency of SMEs across various sectors and regions. According to Barakat and Odeh (2023), SMEs in Jordan that integrated structured innovation teams into their digital transformation efforts reported significant reductions in operational delays and service delivery time. Khalil and Abdallah (2022) found that the presence of digital innovation teams enabled Middle Eastern SMEs to better coordinate tasks and reduce production bottlenecks.

Elsetouhi and Elbeltagi (2021) provided evidence that innovation champions within team settings improved cross-departmental communication and real-time decision-making, boosting efficiency. In Nigeria, Eze and Chinedu (2025) showed that team-based innovation practices contributed to process optimization and leaner workflows, especially in logistics-driven SMEs. Chatterjee and Kar (2021) emphasized the agility that comes from digitally trained innovation teams, noting that SMEs in India who employed such teams outperformed their competitors in cost control and adaptability.

Rantakari and Hyvönen (2024) examined Finnish SMEs and reported that those with active digital innovation cells achieved faster compliance with regulatory changes and operational shifts. Manesh and Rialti (2020) showed that innovation teams improved the synchronization of IT systems with business functions, reducing overheads and latency in operational chains. Finally, Ali and Elsammani (2023) demonstrated that Sudanese SMEs using EDITs improved workflow digitization, reducing redundancy and enhancing customer response time. Collectively, these studies affirm the strong positive link between entrepreneurial digital innovation teams and the operational efficiency of SMEs, emphasizing the teams' role in driving agility, resource optimization, and digital integration across business operations.

Theoretical Framework

This study is underpinned by the Dynamic Capabilities Theory (DCT), developed by Teece, Pisano, and Shuen (1997). The theory posits that in rapidly changing environments, an enterprise's success hinges not merely on the possession of resources, but on the firm's ability to integrate, build, and reconfigure internal and external competencies to address shifting environments. It emphasizes three fundamental capabilities: sensing opportunities and threats, seizing them, and transforming organizational assets to maintain competitiveness (Teece, 2007).

Entrepreneurial characteristics such as innovativeness, resilience, and risk tolerance represent internal behavioral capacities that support dynamic capabilities. Entrepreneurs with strong personal traits are more likely to adapt swiftly to market changes and reconfigure internal processes for efficiency. This aligns with Teece's (2014) assertion that entrepreneurial judgment and leadership are integral to organizational agility.

Similarly, entrepreneurial digital innovation teams serve as platforms to enact dynamic capabilities by harnessing digital technologies, enhancing operational flow, and continuously improving process outcomes through collaborative digital knowledge. Recent empirical applications affirm DCT's relevance. For instance, Lee and Meyer-Doyle (2023) showed that entrepreneurial alertness and team-led digital transformation significantly influence process responsiveness and

efficiency in SMEs. Mueller and Shepherd (2022) also validated that dynamic entrepreneurial capabilities facilitate lean operations and rapid adaptation among firms in resource-constrained settings. In the context of Zamfara SMEs, where infrastructural and institutional challenges persist, dynamic capabilities embedded within the entrepreneurial traits of leaders and the collaborative strength of digital innovation teams can catalyze operational efficiency.

Thus, entrepreneurial characteristics enhance the sensing of opportunities and threats; EDITs facilitate the seizing of these opportunities through digital solutions; together, they enable the transformation of business processes for greater efficiency. The also Dynamic Capabilities Theory provides a coherent lens to examine how intrinsic entrepreneurial qualities and collective digital innovation practices jointly influence the ability of SMEs to sense, seize, and transform processes for enhanced operational outcomes.

3. METHODOLOGY

This study adopted a quantitative research approach using a survey design, which is suitable for analyzing relationships among variables and generalizing findings from a representative sample. The design allows for systematic data collection and statistical analysis that reveal patterns, correlations, and influences among constructs. The choice of design was guided by the nature of the study, which aims to determine the influence of entrepreneurial characteristics and entrepreneurial digital innovation teams on the operational efficiency of SMEs.

The population for this study comprised 10,003 registered Small and Medium Enterprises (SMEs) in Zamfara State, as obtained from the Zamfara State Ministry of Commerce (2024). The sample size of 363 SMEs was derived using the Krejcie and Morgan (1970) sample size determination table, which is appropriate for finite population sampling. A multistage sampling technique was employed. In the first stage, Zamfara State was clustered into three senatorial districts: Zamfara Central, Zamfara North, and Zamfara West. Thereafter, proportionate sampling was used to select respondents from each cluster based on their SME distribution. The constructs, entrepreneurial characteristics, entrepreneurial digital innovation teams, and operational efficiency, were measured using structured questionnaires adapted from validated scales in previous literature. The questionnaire was per-tested for clarity and subjected to expert validation for content relevance. Data analysis was conducted using SPSS version 26. Data screening was performed to assess missing values, detect outliers, and test assumptions of multicollinearity and normality. All assumptions were met. Descriptive statistics were used to summarize the data, followed by correlation matrix to determine associations, and multiple regression analysis to test the hypotheses. The multiple regression analysis was selected for its suitability in testing the predictive relationship between the independent variables and the dependent variable, and for its robustness in handling the scale of data collected. This robust methodological framework ensures the reliability and validity of the findings and supports the generalizability of the conclusions to SMEs within the region.

Model Specification

This study adopts a multiple linear regression model to examine the influence of entrepreneurial characteristics and entrepreneurial digital innovation teams on the operational efficiency of SMEs in Zamfara State. The model is specified as:

$OE=\beta 0+\beta 1EC+\beta 2EDIT+\varepsilon$

Where:

OE = Operational Efficiency (dependent variable)
EC = Entrepreneurial Characteristics
EDIT = Entrepreneurial Digital Innovation Teams
β_0 = Intercept
β_1, β_2 = Regression coefficients
ε = Error term

This model captures how internal traits of entrepreneurs and the functionality of digital innovation teams contribute to enhancing SME efficiency. The assumptions of linear regression, such as linearity, independence, homoscedasticity, and normality, were all tested and satisfied, ensuring the model's suitability and reliability.

4. RESULT AND DISCUSSION OF FINDINGS

This section presents the results of the data analysis conducted to test the influence of entrepreneurial characteristics and entrepreneurial digital innovation teams on the operational efficiency of SMEs in Zamfara State. The analysis includes descriptive statistics, correlation matrix, and multiple regression, followed by a discussion of findings under each hypothesis.

Table 1.
Descriptive Statistics

Variable	Obs	Mean	Std. Dev	Min	Max
Entrepreneurial Characteristics	363	3.87	0.64	2.10	4.90
Entrepreneurial Digital Innovation Teams	363	3.75	0.71	2.00	4.80
Operational Efficiency	363	3.92	0.58	2.30	4.95

Source: SPSS 26 Output, 2025.

The descriptive statistics provide information on the central tendencies and dispersion of the key variables across 363 SMEs in Zamfara State. Entrepreneurial Characteristics recorded a mean score of 3.87 with a standard deviation of 0.64, and responses ranged from 2.10 to 4.90, suggesting that most SME owners exhibit a relatively high level of traits such as innovativeness, risk-taking, and proactiveness. Entrepreneurial Digital Innovation Teams had a mean of 3.75 and a standard deviation of 0.71, with values ranging from 2.00 to 4.80, indicating moderate implementation of digital collaboration practices within SMEs. Operational Efficiency had the highest mean at 3.92 and a standard deviation of 0.58, with a minimum value of 2.30 and a maximum of 4.95, reflecting a generally positive perception of process optimization and internal productivity among respondents. These findings indicate a favorable disposition among SMEs toward entrepreneurial behavior and digital innovation, which may contribute to improved operational performance.

Table 2.
Correlation Matrix

Variables	Entrepreneurial Characteristics	EDITs	Operational Efficiency
Entrepreneurial Characteristics	1.000	0.612	0.658
EDITs	0.612	1.000	0.701
Operational Efficiency	0.658	0.701	1.000

Source: SPSS 26 Output, 2025.

Table 2 presents the correlation coefficients among the key variables in the study. The results indicate a strong positive correlation between Entrepreneurial Characteristics and Operational Efficiency (r = 0.658), suggesting that SMEs led by proactive and innovative entrepreneurs tend to exhibit higher operational performance. Similarly, a strong and positive relationship exists between Entrepreneurial Digital Innovation Teams (EDITs) and Operational Efficiency (r = 0.701), implying that structured digital collaboration teams significantly contribute to enhancing internal processes and productivity. Additionally, Entrepreneurial Characteristics and EDITs are positively correlated (r = 0.612), reflecting the likely synergy between entrepreneurial orientation and digital innovation practices within SMEs. All correlation coefficients are statistically meaningful and indicate a solid foundation for subsequent regression analysis.

Table 3.
Preliminary Statistical Assumption Tests

Test Conducted	Result	Interpretation
Missing Values Check	No significant missing values	Data is complete and reliable for analysis
Outlier Detection	No extreme outliers detected	Data points fall within acceptable range
Normality Test	Data approximately normal	Suitable for parametric statistical tests
Multicollinearity Test (VIF)	VIF < 5 for all variables (no multicollinearity)	Predictors are independent, supporting regression validity

Source: SPSS 26 Output, 2025.

As part of the data screening process, essential assumption tests were conducted to verify the suitability of the dataset for regression analysis. The results show that there were no missing values, confirming the completeness of the data. Outlier analysis did not detect any extreme data points, indicating that responses fall within acceptable bounds. The normality test showed that the data approximates a normal distribution, validating the use of parametric statistical methods. Additionally, multicollinearity diagnostics using Variance Inflation Factor (VIF) revealed that all variables had VIF values below 5, indicating no collinearity issues among the predictors. These outcomes affirm that the dataset met the required assumptions for robust and valid regression analysis.

Table 4.
Multiple Regression Analysis

Variable	Beta (Unstd)	Std. Error	Beta (Std)	t	Sig
Constant	1.12	0.19	—	5.89	0.000
Entrepreneurial Characteristics	0.41	0.07	0.38	5.86	0.000

Variable	Beta (Unstd)	Std. Error	Beta (Std)	t	Sig
EDITs	0.53	0.06	0.45	8.83	0.000

Source: SPSS 26 Output, 2025.

The multiple regression analysis was conducted to assess the influence of Entrepreneurial Characteristics and Entrepreneurial Digital Innovation Teams (EDITs) on Operational Efficiency among SMEs in Zamfara State. The model revealed that both independent variables are statistically significant predictors of operational efficiency. Specifically, Entrepreneurial Characteristics had a positive and significant effect ($B = 0.41$, $\beta = 0.38$, $p < 0.001$), indicating that a one-unit increase in entrepreneurial traits such as proactiveness and innovativeness is associated with a 0.41 unit increase in operational efficiency. Similarly, EDITs showed a stronger positive effect ($B = 0.53$, $\beta = 0.45$, $p < 0.001$), suggesting that structured digital collaboration within SMEs contributes more substantially to enhanced performance outcomes. The high t-values and very low p-values confirm the reliability and statistical significance of these relationships. The constant term ($B = 1.12$) represents the baseline level of operational efficiency when both predictors are held constant. Overall, the regression model confirms that enhancing entrepreneurial traits and fostering digital innovation teams are critical strategies for improving SME efficiency in the region.

Discussion of Findings

H_{o1}: Entrepreneurial Characteristics have no significant influence on the operational efficiency of SMEs in Zamfara State.

The regression results reject the null hypothesis, as Entrepreneurial Characteristics (EC) were found to have a significant positive effect on Operational Efficiency ($B = 0.41$, $\beta = 0.38$, $p < 0.001$). This implies that entrepreneurs who demonstrate higher levels of proactiveness, innovativeness, and risk-taking are more likely to lead SMEs that operate efficiently in terms of resource utilization, process agility, and service delivery. The finding is consistent with prior research by Iwu and Tengeh (2021) and Mwasalwiba and Kalimang'asi (2021), who found that traits such as resilience, self-efficacy, and achievement motivation are crucial to sustaining SME performance. Similarly, Musa and Hakeem (2025) asserted that entrepreneurial attributes drive effective problem-solving and decision-making within African SMEs. Therefore, in the context of Zamfara State, where SMEs face systemic inefficiencies and volatile markets, entrepreneurial orientation appears to be a vital internal mechanism for improving operational outcomes.

H_{o2}: Entrepreneurial Digital Innovation Teams have no significant influence on the operational efficiency of SMEs in Zamfara State.

The regression results also reject this null hypothesis, with Entrepreneurial Digital Innovation Teams (EDITs) exerting a statistically significant and stronger positive influence on Operational Efficiency ($B = 0.53$, $\beta = 0.45$, $p < 0.001$). The stronger influence of EDITs suggests that Zamfara's context, where individual entrepreneurial efforts may be constrained by systematic barriers, structured team collaboration provides a more powerful mechanism for implementing efficient processes and leveraging digital tools. This suggests that SMEs that implement structured, digitally oriented innovation teams are more efficient in terms of workflow management, process digitization, and customer responsiveness. The results align with the findings of Barakat and Odeh (2023), Eze and Chinedu (2025), and Chatterjee and Kar (2021), who all reported that cross-functional innovation teams enhance agility and productivity across SMEs in emerging economies.

In addition, this finding aligns with the dynamic capabilities theory posting that the ability to seize opportunities through collaborative, digital means (EDITs) is a more direct driver of operational transformation than the individual capacity to sense them entrepreneurial characteristics alone. The Dynamic Capabilities Theory (Teece, 1997) supports the idea that digital innovation teams contribute to sensing, seizing, and transforming organizational assets to maintain competitiveness in changing environments. In the Zamfara context, where SMEs often lag in digital infrastructure, this finding underscores the transformative power of internal team collaboration in overcoming environmental limitations and driving sustainable operational gains.

These findings collectively emphasize that both entrepreneurial traits and digital innovation teamwork are not only statistically significant but also practically meaningful in improving SME operational efficiency. They reinforce the need for policymakers, development agencies, and SME leaders to invest in capacity-building, leadership development, and team-based digital transformation strategies.

5. CONCLUSION AND RECOMMENDATION

This section provides a summary of the key findings and proposes practical recommendations based on the results of the study. The research examined the influence of entrepreneurial characteristics and entrepreneurial digital innovation teams on the operational efficiency of SMEs in Zamfara State. The results confirmed that both variables significantly and positively influence SME efficiency, suggesting that internal capacities are critical

drivers of performance in resource-constrained environments.

Conclusion

The findings of this study reveal that entrepreneurial characteristics; such as innovativeness, risk-taking, and proactiveness, significantly enhance the operational efficiency of SMEs. Likewise, entrepreneurial digital innovation teams play a crucial role in streamlining processes, integrating technology, and improving responsiveness to market demands. These results affirm the importance of internal entrepreneurial traits and team-driven digital transformation as key enablers of sustainable SME performance, especially in underdeveloped states like Zamfara State.

Recommendations

Strengthen Entrepreneurial Capacity through Targeted Training:

Given the significant impact of entrepreneurial characteristics on operational efficiency, it is recommended that government agencies, business development services, and NGOs design and implement continuous capacity-building programs that enhance core entrepreneurial traits such as innovation, risk management, and strategic thinking among SME owners.

Support the Formation of Digital Innovation Teams within SMEs:

In light of the strong positive influence of EDITs, policymakers and SME stakeholders should promote the creation and support of digital innovation teams by offering incentives, subsidized digital tools, and training in collaborative technologies. This will enable SMEs to embed digital solutions more effectively and improve operational performance.

Limitations of the Study

While this study offers valuable information on the internal drivers of operational efficiency among SMEs in Zamfara State, it is not without limitations. First, the research employed a cross-sectional survey design, which restricts the ability to infer causality between variables over time. Second, the study focused solely on SMEs within a single Nigerian state (Zamfara), limiting the generalizability of the findings to other geopolitical or economic contexts. Additionally, the reliance on self-reported data may introduce bias, as respondents could overstate or understate their organizational capabilities or performance. Finally, the study measured entrepreneurial characteristics and digital innovation practices using standardized questionnaires, which may not fully capture the detailed or informal practices common in grassroots SME settings.

Frontiers for Further Research

Future research could expand on this study in several ways. Longitudinal studies are recommended to assess how entrepreneurial characteristics and digital innovation practices influence operational efficiency over time. Comparative studies across multiple states or regions could offer a broader perspective and help identify contextual factors that moderate these relationships. Additionally, qualitative or mixed-methods approaches could enrich the understanding of how entrepreneurial traits and innovation teams function in practice, particularly in informal or underserved business environments. Further research may also explore the mediating or moderating roles of external factors such as regulatory frameworks, digital infrastructure, or access to finance in shaping SME operational outcomes.

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