

Effect of Technology Innovation on the Grassroot Entrepreneurship Development in Southeast Nigeria

¹Magnus M. Ofondu, &

²Larry O Achara

^{1&2}Department of Management,
Abia State University, Uturu,
Nigeria

Article DOI:

10.48028/iiprds/ijdshmss.v16.i2.06

Keywords:

Development,
Entrepreneurship,
Grassroot,
Innovation,
Technology

Abstract

The study examined the effect of technology innovation on the grassroot entrepreneurship development in southeast Nigeria. The specific objectives are to; examine the effect of financial technology innovations (Fintech) on the grassroot entrepreneurship development and evaluate the effect of E-commerce on the grassroot entrepreneurship development in southeast Nigeria. The study used a descriptive survey as its research design. A structure questionnaire design with a five-point Likert scale to collect data for the study. The data were analyzed using descriptive statistics like frequency counts and percentages, and the hypotheses were tested at the 0.05 level of significance using inferential statistics like Chi-square(x2). The result revealed that financial technology innovations (Fintech) have a significant effect on the grassroot entrepreneurship development with a p-value ($0.000 < 0.05$). And E-commerce has a significant effect on the grassroot entrepreneurship development with a p-value ($0.025 < 0.05$) in southeast Nigeria. The study concluded that technology innovation has significant effect on the grassroot entrepreneurship development in southeast Nigeria. The study recommended among others that Government and private sector stakeholders should work collaboratively to promote awareness and accessibility of Fintech solutions among grassroots entrepreneurs.

Corresponding Author:
Magnus M. Ofondu

Background to the Study

Technological innovation is the engine driving progress in the modern world, fundamentally altering how we live, work, and interact (Obeng, et al 2024). It can be defined as the creation, development, and implementation of new or significantly improved technologies, products, processes, or services (Kamara & Yu 2024). This encompasses a wide range of activities, from initial concept to commercialization, all centered on leveraging technological advancements to meet evolving needs and solve complex problems (Mostafa, et al., 2025). "Technological innovation" is preferred over "technology innovation" as it emphasizes improving business value through technological aspects (Ameen, et al 2021). The history of technology is as old as humanity itself (Oyeniran, et al 2024). Early humans used stone tools as early as 3.3 million years ago. The invention of the wheel around 3500 BC marked a significant advancement in transportation and trade. Fire, agriculture, and writing were other pivotal innovations of early technological history (Raj, and Upadhyay, 2020). Technology innovation is a critical driver of economic growth, enhanced productivity, and societal advancement.

Grassroots entrepreneurship embodies the spirit of local innovation and economic empowerment, making it a vital force for positive change in local communities and the global landscape (Obeng, et al 2024). It refers to the creation, development, and management of new ventures and businesses at the local level, often driven by individuals or small teams with limited resources but a strong desire to address local needs and create economic opportunities (Mostafa, et al., 2025). Technology innovation, the creation, development, and implementation of new or significantly improved technologies, products, processes, or services, plays a crucial role in fostering and accelerating the growth of grassroots entrepreneurship (Hurani, et al., 2024).

Technology innovation and entrepreneurship are interrelated concepts that play a crucial role in shaping industries and society (Kamara & Yu 2024). Entrepreneurs are defined as risk-takers who introduce innovative goods and services, fundamentally altering market dynamics. Technology empowers micro-entrepreneurs, particularly those from disadvantaged backgrounds, with the tools to manage their businesses efficiently, reach wider audiences, and compete on a global scale (Ndesaulwa, & Kikula, 2016). It provides tools and platforms to overcome barriers like distance, limited access to markets, and financial resources. Technology innovation also enhances operational efficiency for grassroots entrepreneurs. Tools such as mobile payment systems, inventory management software, and customer relationship management applications streamline business processes, reduce costs, and improve service delivery. For example, farmers can use mobile apps to monitor weather patterns, access market prices, and receive agricultural advice, leading to better decision-making and increased yields (Hurani, et al., 2024).

In Southeast Nigeria, grassroots entrepreneurship has emerged as a vital driver of economic growth and social change. This region, characterized by its rich cultural heritage and vibrant entrepreneurial spirit, faces unique challenges and opportunities that technology innovation can significantly influence. Grassroots entrepreneurship refers to

small-scale, community-driven enterprises that are often initiated by individuals or groups using limited resources to address local needs and create economic opportunities (Bates et al 2011). With the advent of technology, particularly digital tools and platforms, the landscape of entrepreneurship in Southeast Nigeria is undergoing a transformative shift.

Statement of the Problem

Technology innovation has become an essential catalyst for entrepreneurship development by improving business efficiency, expanding market access, and enhancing competitiveness. However, despite these benefits, many grassroots entrepreneurs in Southeast Nigeria have not fully leveraged technological innovations due to persistent structural and institutional challenges. Empirical evidence indicates that inadequate digital infrastructure, poor internet connectivity, limited access to finance, and low levels of digital literacy significantly constrain technology adoption among small businesses in Nigeria (Okundaye, Fan, & Dwyer, 2019; World Bank, 2021). These constraints reduce entrepreneurs' ability to improve productivity, access wider markets, and sustain business growth.

Furthermore, insufficient government support, inconsistent digital policies, and inadequate investment in rural ICT infrastructure continue to limit the diffusion of technological innovation among grassroots enterprises (OECD, 2019). Although previous studies have established positive relationships between technology innovation and entrepreneurial performance, most have focused on urban SMEs, with limited attention given to grassroots entrepreneurs in Southeast Nigeria. Consequently, there is inadequate empirical evidence on how technology innovation influences grassroots entrepreneurship development within this context. This study therefore seeks to address this gap by examining the effect of technology innovation on grassroots entrepreneurship development in Southeast Nigeria, thereby providing evidence to inform policy and entrepreneurial support programmes.

Objective of the Study

The main objective of the study is the effect of technology innovation on the grassroots entrepreneurship development in southeast Nigeria. The specific objectives are to;

- i. Examine the effect of the financial technology innovations (Fintech) on the grassroots entrepreneurship development in southeast Nigeria.
- ii. Evaluate the effect of E-commerce on the grassroots entrepreneurship development in southeast Nigeria.

Hypotheses of the Study

- i. Financial technology innovations (Fintech) have no significant effect on the grassroots entrepreneurship development in southeast Nigeria.
- ii. E-commerce has no significant effect on the grassroots entrepreneurship development in southeast Nigeria.

Review of Related Literature

Conceptual Review

Technology Innovation

Technology innovation is defined as the creation and application of new or improved technologies, tools, systems, and processes that bring about significant advancements or breakthroughs in various fields. It involves harnessing knowledge, expertise, and resources to develop innovative solutions that solve problems, improve efficiency, drive progress, and deliver value. The importance of innovation is broader; however, it does not comprise only new products or processes, but includes improved ones that have resulted from callow-tech sectors, which might have economic and social effects (Mohanty, et al., 2018). Atalay, Anafarta, and Sarvan (2013) describe technological innovation as an integrated process with activities of technology, organizations, business, and finance. From this process, new products and production techniques are exploited to obtain semi-finished products.

According to Ndesaulwa & Kikula (2016), Technological innovation is the process by which organizations implement the design and production of goods and services that are new to them, regardless of whether they are different from their competitors, clients, or the world. In addition, it involves the scheduling of activities such as the application of new technology and techniques; implementing new systems in production; enhancing the quality of production; new production; providing new service; and new product exploration. Studies have shown that organizations with innovative activity dealing with technology do record greater profit than other firms, so that the effect on employment, irrespective of industry, size, or other characteristics of firms, is positive (Huxtable & Schaefer, 2016).

Financial technology innovations (Fintech)

Fintech is a business and banking company that translates to financial technology. It is the technology used and applied in the financial services sector, including its involvement in mobile payments, money transfer, loans, fundraising, and asset and property management. Fintech investment has grown exponentially recently in the world and is likely to continue to increase, given that Fintech is not only related to the financial services sector, but all companies that deal with the financial services industry, and Fintech startups are usually smart and capable of causing disruption (Almomani & Alomari, 2021). Fintech is described as those products and services that rely on technology to improve the quality of traditional financial services. They are quick and easy. In most cases, these services and products are developed by startup companies, which seek to improve retail and corporate banking in cooperation or competition with existing financial service providers. Global investments in financial technology have achieved rapid growth in the past five years, and expectations are that they will continue to grow strongly (Almomani & Alomari, 2021).

Initially focused on backend technology for financial institutions in the early 21st century, fintech has since expanded into consumer-centric services. Today, it spans diverse sectors,

including retail banking, education, investment management, nonprofits, and the burgeoning cryptocurrency market. This transition highlights fintech's versatility and its profound impact on both traditional financial systems and everyday financial engagements. The rapid evolution of FinTech presents both opportunities and challenges for regulatory compliance (Oyeniran et al., 2024). FinTech innovations enhance financial inclusion by reaching underserved populations, improve operational efficiency through automation, and foster innovation in financial products and services (Raj and Upadhyay, 2020). FinTech innovations such as AI, blockchain, and quantum computing are revolutionizing financial services, enhancing operational efficiency, and reshaping customer experiences. The evolving regulatory landscape poses complexities for financial institutions and FinTech firms, requiring adaptive compliance strategies and global coordination to ensure regulatory adherence and consumer protection (Obeng et al, 2024).

E-commerce

E-commerce is referred to as electronic commerce. It means the electronic media and the internet for dealing with goods and services. E-Commerce entails a company accessing the internet, as well as IT, such as the electronic data interchange (EDI). E-commerce concerns an internet vendor's website, trading goods or services to the user directly from the platform. The gateway uses a wireless purchase cart or a purchase basket to pay by credit card, debit card, or electronic fund transfer (EFT). A further description is as follows: Electronic communications and digital information processes in business transactions are used to create, modify, and redefine value generation relations between organizations and individuals (Mostafa, et al., 2025).

Rahayu & Day (2017), with the increasing spread of ICTs, specifically the Internet, the global corporate world is pushing rapidly into e-commerce (Business-to-Business). As the Internet enables consumers to enter the global economy, they can compare prices across areas, find out how they vary by request, and become aware of substitution. The buyers obtain a distinct advantage. Thanks to market openness, consumers can conveniently compare e-commerce offerings from different websites. The rivals would immediately be one click away from the customer if the company were electronic. If consumers aren't comfortable with certain e-goods, content's pricing, or services, they can adjust even more quickly than in traditional terms. They don't need a physical store from the point of view of the vendors. The biggest advantage from the consumer viewpoint is that it improves dramatically and saves lots of time, and is convenient to access from everywhere in the world. At any time, the customer is free to place the order (Rahayu & Day, 2017).

Grassroots Entrepreneurship Development

Grassroots entrepreneurship is broadly defined as small-scale, locally embedded entrepreneurial activity that emerges from within communities rather than from formal corporate or state actors. Grassroots entrepreneurship development has emerged as a critical approach to fostering inclusive and sustainable economic growth, especially in developing economies where poverty, unemployment, and inequality remain pressing

challenges. (Kumar et al., 2013). One of the distinguishing features of grassroots entrepreneurship development is its close connection to the concept of empowerment. Scholars argue that grassroots entrepreneurship provides individuals and marginalized groups with the tools to exercise agency, achieve self-reliance, and participate in local economic governance (George et al., 2019). This empowerment goes beyond financial independence; it extends to social and cultural spheres, where entrepreneurship can help break cycles of dependency and foster a sense of dignity and belonging.

Grassroots entrepreneurship development is also tied to sustainability, both in the environmental and economic sense. Many grassroots entrepreneurs rely on indigenous knowledge systems and environmentally friendly practices in their production processes, making their businesses inherently sustainable (Mair, Wolf, & Seelos, 2016). Moreover, the emphasis on community-based solutions helps ensure that entrepreneurship contributes to localized development rather than external profit extraction. The role of grassroots entrepreneurship in poverty alleviation has been widely documented. By creating small-scale employment opportunities, such ventures provide income for low-income households, especially in rural areas. According to Ojong, Simba, and Dana (2021), grassroots entrepreneurship acts as a buffer against structural unemployment and economic shocks, particularly in sub-Saharan Africa, where formal job creation lags behind population growth. For women and youth, grassroots entrepreneurship offers a pathway into economic participation, often challenging existing cultural and structural barriers.

Theoretical Reviews

Innovation Diffusion Theory

Innovation Diffusion Theory, propounded by Everett Rogers in 2003, provides a robust framework for analyzing the adoption and spread of financial technology (fintech) innovations. The theory identifies five key elements: relative advantage, compatibility, complexity, trialability, and observability that influence how innovations diffuse within societies. In the context of fintech, relative advantage is evident in how mobile banking, peer-to-peer lending, and blockchain-based solutions offer faster, cheaper, and more inclusive services than traditional banking systems (Lee & Shin, 2018). Innovation Diffusion Theory helps clarify the drivers and barriers shaping fintech adoption globally, highlighting pathways for inclusive digital finance. However, complexity remains a barrier, particularly in developing economies where digital literacy is low (Kamara & Yu, 2024). Trialability, through regulatory sandboxes and pilot programs, has enabled fintech firms to test products while ensuring compliance.

The Unified Theory of Acceptance and Use of Technology (UTAUT)

The Unified Theory of Acceptance and Use of Technology, developed by Venkatesh et al. (2003), provides a comprehensive framework for understanding the determinants of technology adoption, and it has been widely applied in the study of e-commerce. The model emphasizes four core constructs: performance expectancy, effort expectancy, social influence, and facilitating conditions. In e-commerce, performance expectancy relates to consumers' perceptions of convenience, cost savings, and efficiency when

purchasing goods online (Alalwan et al 2015). Effort expectancy is reflected in the ease of navigating online platforms and the usability of mobile shopping applications, which directly affect adoption rates (Marinković & Kalinić, 2017). Facilitating conditions, such as internet access, payment security, and regulatory frameworks, strongly determine e-commerce adoption, particularly in emerging markets where infrastructural gaps persist (Ameen et al., 2021).

Empirical Review

Muhammad Nur Afiat, and Syamsu Rijal, (2023) in their study analyzed the use of e-commerce in improving the competitiveness of entrepreneurial businesses. This research is qualitative in nature. The techniques used to obtain information involve careful observation and meticulous note-taking, followed by analytical procedures such as data reduction, visualization, and inference. The study results show that the use of e-commerce in entrepreneurial businesses has great potential to improve competitiveness. E-commerce provides global accessibility, operational efficiency, better customer interaction, in-depth data analysis, and the ability to adapt to market changes. With the right strategy, entrepreneurial businesses can leverage these benefits to achieve greater success.

Hurani, et al., (2024) in his study explore opinions and attitudes concerning the emergence of FinTech on the Future of Financial Services Industry in Palestine. In order to achieve the objectives of the study, eleven in-depth interviews have been conducted with a group of managers working in the banking and financial services sectors represented by administrative staff from departments specialized in technical fields, product and software development, information technology, and electronic payments services. In addition, the study conducts a content analysis for the reports and articles provided by the participating institutions. Data collected were analyzed using thematic analysis. Data Findings on such Themes and Patterns were developed and organized using NVivo software. The study found that there is an important role of the incumbent banking and financial institutions, academic bodies, technology companies, and business incubators to create a conducive environment for FinTech ecosystem in Palestine. In addition, the findings show that FinTech in Palestine face several challenges most prominently rules and regulations, cybersecurity, customers' lack of trust toward digital services, etc.

Nemer, (2022) in his study examined the impact of financial technology (FinTech) on economic growth in Palestine. Moreover, the study used annual time series data from the Palestinian Ministry of National Economy (MoNE), the Palestinian Ministry of Finance and Planning (MoFP), as well as the Palestinian Central Bureau of Statistics (PCBS) and the Palestinian Monetary Authority (PMA), in addition to investigating the current study of the impact of FinTech on Palestinian economic development for the period (2008 to 2021). Also, the co-integration was evaluated using a distributed autoregressive approach, and a vector error correction model was used to consider long-and short-term causation. However, the data shows that FinTech products (number of people using the Internet, number of broadband subscriptions, number of mobile cellular subscriptions, number of automated transfer machines, number of branches) contribute to the growth in

financial inclusion, which in turn fuels the growth economy in Palestine. Moreover, these results indicate that the (PMA) in Palestine is focusing more on expanding access to financial services.

Salaudeen, (2024) studied the potential of digitalization and e-commerce in economic diversification among Nigerian startups and digital entrepreneurs. The primary objectives are to evaluate the role of digitalization in promoting economic diversification, assess the impact of e-commerce on business performance and market reach, and analyze the challenges and opportunities faced by startups in adopting these technologies. A survey method was employed, targeting a population of 140 startups and digital entrepreneurs registered with small and medium enterprises development agency of Nigeria {SMEDAN} in Kano as of 2024. Using Krejcie and Morgan's sample formula, a sample size of 103 respondents was determined. Data were collected via online questionnaires and analyzed using descriptive statistics. Findings reveal that digitalization has significantly contributed to business growth and market expansion but faces challenges related to operational efficiency and product diversification. E-commerce has enhanced sales performance and revenue but has not uniformly improved market reach or customer acquisition.

Methodology

The study used a descriptive survey as its research design. Since the researcher may create data using standardized collecting techniques based on highly organized research instruments, well-defined study topics, and related variables, this design is deemed appropriate. All of the participants in this study are staff members of an entrepreneurship development organization in South-East Nigeria. 869 employees of the chosen companies made up the overall population. We had a specific population for the study; thus, we used the Taro Yamane approach to randomly select a total sample size of 274 employees.

The personnel were asked to complete a well-designed and self-developed questionnaire called "The Effect of the technology innovation on the grassroots entrepreneurship development in southeast Nigeria." There were two sections on the questionnaire (A and B). While Section B comprised questions that elicited replies from the respondents with response options of Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD), Section A was for gathering information on the respondents' personal data. By administering a questionnaire in the chosen companies, the researcher was able to gather the necessary data. The researcher was responsible for administering the questionnaire.

To get answers from the staff, 274 copies of the questionnaire were given out, and the researcher immediately collected them. There were 261 valid questionnaires left for the researcher after 13 were incorrectly completed and never returned. The descriptive statistics of frequency counts and percentages, as well as the inferential statistics of Chi-square (χ^2), were used to examine the questionnaire responses. The study questions and demographic data were analyzed using descriptive statistics like frequency counts and percentages, and the hypotheses were tested at the 0.05 level of significance using inferential statistics like Chi-square(χ^2).

Result Discussion

Reliability

The reliability of the research instrument was determined using the Cronbach's alpha. A co-efficient value of 0.75 indicated that the research instrument was reliable.

Section A: Presentation of Demographic Data

Table 1: Distribution of Respondents According to Firm

Firm	Population [Sample]	Percentage (%)
Millennium Plastic Industries Awka	248 [78]	[28%]
Destiny Poly plastics (ENT) Obosi	195 [61]	[22%]
PZ Cussons Nigeria Plc	63 [20]	[07%]
Crown Flour Mills Limited	208 [66]	[24%]
Alo Aluminum	97 [31]	[11%]
Berger paint	58 [18]	[06%]
Total	869 [274]	100%

The distribution of respondents from the chosen entrepreneurship firm is displayed in Table 1 as follows: PZ Cussons Nigeria Plc 20 (07%), Crown Flour Mills Limited 66 (24%), Alo Aluminum 31 (11%), Berger paint 18 (06%), Destiny Polyplastics (ENT) Obosi 61 (22%), and Millennium Plastic Industries Awka 28 (%). Nevertheless, 261 of the 274 surveys that were distributed were returned. As a result, around 95% of the questionnaires were returned.

Table 2: Presentation of Demographic Data

	Frequency	Percentage
Gender		
Male	188	72%
Female	73	28%
Marital Status		
Single	164	63%
Married	93	36%
Divorced	04	01%
Age		
20-29 years	80	31%
30-39 years	96	37%
40-49 years	53	20%
>50 years	32	12%
Working Experience		
< 5 years	139	53%
5-10 years	63	24%
11-20 years	39	15%
>20 years	20	08%
Qualification of Respondents		
Bachelor's Degree	133	51%
Master's degree	62	24%
PhD	21	08%
Professional Certificates	45	17%

Source: Field work 2026

The demographic profile of the respondents, shown in Table 2, provides important details about the population under study. 188 respondents, or 72% of the sample, are men, making up the bulk of responders. When it comes to marital status, a sizable fraction of the population is unmarried (164 people, or 63%), whilst a lesser percentage (93 people, or 36%) are married. In terms of age distribution, the highest percentage (96 people, or 37%) belongs to the 30-39 age group, which is followed by the 20-29 age group (90 people, or 31%). There is a lower representation of older age groups, with 32 people (12%) over 50 and 53 people (20%) between the ages of 40 and 49. The majority of respondents (139, or 53%) had fewer than five years of work experience, while smaller percentages have five to ten years (63, or 24%), eleven to twenty years (39, or 15%), and more than twenty years (20, or 8%).

When it comes to educational credentials, the largest percentage of people have a bachelor's degree (133, or 51%), followed by professional certifications (45, or 17%). Those with a master's degree make up 62 people (24%), and those with a doctorate make up the smallest group, 21 people (8%). These results provide important information on the population's makeup by highlighting key traits like the distribution of genders, marital status, age demographics, work experience, and academic accomplishments. Decision-making processes in a variety of sectors can benefit from an understanding of these demographics, which allows for customized methods to satisfy the unique needs and preferences of the group being studied.

Exploratory Factor Analysis

By finding patterns in the interactions between variables, the statistical technique known as exploratory factor analysis (EFA) can reveal a dataset's underlying structure. Researchers can better understand the relationships between variables and inform future analysis or research projects by using EFA to uncover the underlying constructs of their data. The KMO's chi-square verifies that each variable's particular construct is suitable for a factor analysis technique.

Table 3: Financial Technology Innovation

<i>Chi-squared Test</i>			
	Value	Df	p
Model	2.893	2	0.235

E-commerce

<i>Chi-squared Test</i>			
	Value	Df	p
Model	4.421	5	0.490

Grassroot Entrepreneurship Development

<i>Chi-squared Test</i>			
	Value	df	p
Model	4.421	5	0.490

Table 4: Exploratory Factor Analysis

	<i>Factor Loadings</i>			
	Factor 1	Factor 2	Factor 3	Uniqueness
FTI1	0.758			0.513
FTI2	0.730			0.467
FTI3	0.693			0.477
FTI4	0.681			0.589
FTI1	0.632			0.473
ECI5	0.581			0.685
ECA3	0.573			0.587
ECA4		1.008		0.002
ECA1		0.995		0.032
GEDI1			0.903	0.336
GEDI2			0.721	0.400
GEDI3			0.552	0.650
GEDI4				0.746

Source: The applied rotation method is Promax.

Table 4's factor loadings provide light on the connections between the underlying factors found by factor analysis and the observable variables. Higher factor loading variables (e.g., 0.758, 0.730, 0.693, 0.681, 0.632, 0.581, and 0.573) in Factor 1 show stronger relationships with this latent factor. These loadings imply a close relationship between these variables and their substantial contribution to the overall theme or construct that Factor 1 represents. The significance of Factor 1 in explaining the variance within the dataset is further supported by the consistency and size of these loadings.

Strong correlations with the variables loading on it are indicated by factor 2, which has factor loadings of 1.008 and 0.995. These variables may exhibit even stronger correlations with Factor 2 than they do with Factor 1, as indicated by loadings greater than 1. Factor 2 probably captures a clear underlying theme or dimension shared by variables with such large loadings.

With factor loadings of 0.903, 0.721, and 0.552, Factor 3 indicates a less significant but still significant correlation with the variables that load on it. There is still a noticeable pattern or relationship between the variables, even though the loadings are lower than those in Factors 1 and 2. This implies that a different but less noticeable feature of the dataset is captured by Factor 3, which may indicate a specialized or niche dimension in the larger context.

Table 5: Factor Characteristics

	Eigenvalues	Unrotated solution			Rotated solution		
		SumSq. Loadings	Proportion var.	Cumulative	SumSq. Loadings	Proportion var.	Cumulative
Factor 1	4.516	4.060	0.312	0.312	3.195	0.246	0.246
Factor 2	1.964	1.710	0.132	0.444	2.118	0.163	0.409
Factor 3	1.608	1.276	0.098	0.542	1.731	0.133	0.542

The factor characteristics are shown in Table 5. Three different factors that each explain different amounts of variance in the dataset were found using this factor analysis. With an Eigenvalue of 4.516, Factor 1 was found to be the most dominating, indicating its significant explanatory power. Strong correlations are shown by variables that load significantly on Factor 1, indicating a unified underlying theme that is probably essential to the structure of the dataset. With an Eigenvalue of 1.964, Factor 2 accounted for a substantial amount of the variation, suggesting that it is relevant, albeit less so than Factor 1. Factor 2 variables exhibit moderate intercorrelations, suggesting a secondary but apparent underlying pattern in the data. Finally, out of all the variables that were retrieved, Factor 3 had the least impact, with an Eigenvalue of 1.608. With variables showing weaker correlations than those in Factors 1 and 2, Factor 3 nonetheless reveals a nuanced element of the dataset while having a lesser explanatory power. This implies that, in contrast to the more general themes explained by the factors that came before it, Factor 3 can reflect a more specialized or unique dimension within the data.

As a result, three unique factors that each contributed differently to the variance of the dataset were identified by the factor analysis. While Factors 2 and 3 clarified other, less obvious patterns in the data, Factor 1 was the main driver and accounted for a significant amount of the variance. Each factor's Eigenvalue guided the interpretation of its individual contributions by offering quantitative insights into its relative importance.

Hypothesis Testing

Table 6: Goodness of Fit Test

	R-Square	Adjusted R-Square
grassroot entrepreneurship development	0.720	0.587

Table 7: Hypotheses testing results

Hypothesis		Beta	Std.Dev	T Statistic	P-Values	2.5%	97.5%
H ₀₁	Financial technology innovations -> grassroots entrepreneur develop	0.143	0.023	6.190	0.000	0.158	0.872
H ₀₁	E-commerce > grassroots entrepreneur develop	- 0.409	0.102	4.001	0.025	0.492	0.812

Hypotheses were tested to ascertain the significance. Hypothesis evaluates whether the predictor variable has a significant effect on the grassroots entrepreneurship development (GED) in southeast Nigeria. The results revealed that financial technology innovations (Fintech) and E-commerce have a statistically significant effect on the grassroots entrepreneurship development (GED) in South-East Nigeria respectively as shown in Table 7.

Therefore, at a 5% level of significance financial technology innovations (Fintech) and E-commerce were statistically significant given that [$\beta_1 = 0.143$; $\beta_2 = 0.409$] and [p-value = 0.000; p-value = 0.025] respectively. This implies that a unit increase in financial technology innovations (Fintech) and E-commerce will cause a corresponding unit increase in grassroots entrepreneurship development (GED) in Nigeria. Also, The R-squared (R^2) and adjusted R-squared (Adjusted R^2) values assess the goodness of fit of a regression model. The R-squared value of 0.720 indicates that approximately 72% of the variability in the dependent variable (grassroots entrepreneurship development (GED) in southeast Nigeria) is explained by the independent variables (financial technology innovations (Fintech) and E-commerce) included in the model. Stated otherwise, a sizable amount of the volatility in the target variable can be explained by the model. This implies that the independent variables included in this investigation as a whole have a high capacity to explain the variance seen in the dependent variable.

The number of predictors in the model is taken into consideration and the R-squared value is adjusted accordingly, yielding an adjusted R-squared value of 0.587. The inclusion of superfluous predictors that do not substantially add to the explanation of the variance in the dependent variable is penalized. The model may have some overfitting in this instance, or some of the included predictors may not be as significant, as indicated by the adjusted R-squared value being marginally lower than the R-squared value. Overall, the modified R-squared value offers a more cautious estimate, considering the complexity of the model, even while the R-squared number indicates that the regression model explains a significant amount of the variability in the dependent variable. To increase the model's generalizability and forecast accuracy, more research and improvement may be required.

Conclusion

This study examined the effect of technology innovation on grassroots entrepreneurship development in Southeast Nigeria, with particular emphasis on the roles of financial

technology (FinTech) and e-commerce. The findings demonstrate that technology innovation significantly enhances grassroots entrepreneurship by improving access to financial services, expanding market opportunities, increasing operational efficiency, and strengthening business competitiveness. These outcomes reinforce the growing body of evidence that digital technologies are important enablers of entrepreneurial growth and local economic development in emerging economies.

The study contributes to knowledge by providing empirical evidence on the relationship between technology innovation and grassroots entrepreneurship within the context of Southeast Nigeria, where empirical studies remain limited. Its findings also have practical implications for policymakers, development agencies, financial institutions, and technology providers by highlighting the need for investments in digital infrastructure, financial inclusion, digital literacy, and supportive entrepreneurship policies. Although the study was limited to selected states in Southeast Nigeria, which may affect the generalizability of the findings to other regions, it provides a useful foundation for future research. Subsequent studies should examine additional dimensions of technology innovation, adopt longitudinal research designs, and extend investigations to other geopolitical zones in Nigeria for broader comparative analysis.

Recommendations

To maximize the positive effects of technology innovation on grassroots entrepreneurship development in Southeast Nigeria, the following recommendations are proposed:

- i. Government at all levels should strengthen digital infrastructure, improve broadband accessibility, and collaborate with financial institutions and technology firms to expand affordable FinTech services for grassroots entrepreneurs through targeted digital literacy and entrepreneurship training programmes.
- ii. Relevant stakeholders should support the adoption of e-commerce by providing technical assistance, affordable digital platforms, and incentives that enable grassroots entrepreneurs to expand their market reach and improve business sustainability.

References

- Adewale, S. A., (2024). Exploring the potential of digitalization and E-commerce in economic diversification: case studies from Nigerian startups and digital entrepreneurs, *Journal of Business Development and Management Research*.
- Afiat, M. N., & Rijal, S. (2023). Analysis of the use of e-commerce in improving entrepreneurial business competitiveness, *Jurnal Minfo Polgan*, 12(1), 468-479.
- Alalwan, A. A., Rana, N. P., Dwivedi, Y. K., Lal, B. & Williams, M. D., (2015). October. adoption of mobile banking in Jordan: Exploring demographic differences on customers' perceptions, In *Conference on e-Business, e-Services and e-Society* (pp. 13-23). Cham: Springer International Publishing.
- AlMomani, A. A., & Alomari, K. F. (2021). Financial technology (FinTech) and its role in supporting the financial and banking services sector, *International Journal of Academic Research in Business and Social Sciences*, 11(8), 1793-1802.
- Ameen, N., Tarhini, A., Reppel, A., & Anand, A. (2021). Customer experiences in the age of artificial intelligence, *Computers in Human Behavior*, 114, 106548.
- Atalay, M., Anafarta, N. & Sarvan, F., (2013). The relationship between innovation and firm performance: An empirical evidence from Turkish automotive supplier industry, *Procedia-social and Behavioral Sciences*, 75, pp.226-235.
- Badwan, N., & Awad, A. (2022). The impact of financial technological advancement (FinTech) on the economic growth: Evidence from Palestine, *Asian Journal of Economics, Business and Accounting*, 22(23), 50-65.
- Bates, T., Lofstrom, M., & Servon, L. J. (2011). Why have lending programs targeting disadvantaged small business borrowers achieved so little success in the United States?. *Economic Development Quarterly*, 25(3), 255-266.
- George, G., Baker, T., Tracey, P., & Joshi, H. (2019). Inclusion and innovation: A call to action. In *Handbook of inclusive innovation* (pp. 2-22). Edward Elgar Publishing.
- Hurani, J., Abdel-Haq, M. K., & Camdzic, E. (2024). FinTech implementation challenges in the Palestinian banking sector, *International Journal of Financial Studies*, 12(4), 122.
- Huxtable, J., & Schaefer, D. (2016). On Servitization of the Manufacturing Industry in the UK, *Procedia Cirp*, 52, 46-51.
- Kamara, A. K., & Yu, B. (2024). The impact of FinTech adoption on traditional financial inclusion in Sub-Saharan Africa. *Risks*, 12(7), 115.

- Kumar, V., Chand, V. S., Zhang, L., Hoppers, C. A. O., Zhang, W., Esders, M., & Gupta, A. K. (2013). Grassroots innovations for inclusive development: Need for a paradigmatic shift, *Vikalpa*, 38(3), 103-122.
- Lee, I., & Shin, Y. J. (2018). Fintech: Ecosystem, business models, investment decisions, and challenges, *Business horizons*, 61(1), 35-46.
- Mair, J., Wolf, M., & Seelos, C. (2016). Scaffolding: A process of transforming patterns of inequality in small-scale societies, *Academy of Management Journal*, 59(6), 2021-2044.
- Marinkovic, V., & Kalinic, Z. (2017). Antecedents of customer satisfaction in mobile commerce: Exploring the moderating effect of customization, *Online Information Review*, 41(2), 138-154.
- Mohanty, A. K., Vivekanandhan, S., Pin, J. M., & Misra, M. (2018). Composites from renewable and sustainable resources: Challenges and innovations, *Science*, 362(6414), 536-542.
- Mostafa, S., Palmer, P., & Nguyen, Q. (2025). Evolution of E-commerce in business: A review. *The Palgrave Handbook of Breakthrough Technologies in Contemporary Organisations*, 341-355.
- Ndesaulwa, A. P., & Kikula, J. (2016). The impact of technology and innovation (technovation) in developing countries: A review of empirical evidence, *Journal of Business and Management Sciences*, 4(1), 7-11.
- Obeng, S., Iyelolu, T. V., Akinsulire, A. A., & Idemudia, C. (2024). The transformative impact of financial technology (FinTech) on regulatory compliance in the banking sector, *World Journal of Advanced Research and Reviews*, 23(1), 2008-2018.
- OECD. (2019). *OECD SME and entrepreneurship outlook 2019*, Paris, France: OECD Publishing.
- Ojong, N., Simba, A., & Dana, L. P. (2021). Female entrepreneurship in Africa: A review, trends, and future research directions, *Journal of Business Research*, 132, 233-248.
- Okundaye, K., Fan, S. K., & Dwyer, R. J. (2019). Impact of information and communication technology in Nigerian small-to-medium-sized enterprises, *Journal of Economics, Finance and Administrative Science*, 24(47), 29-46.
- Oyeniran, O. C., Modupe, O. T., Otitoola, A. A., Abiona, O. O., Adewusi, A. O., & Oladapo, O. J. (2024). A comprehensive review of leveraging cloud-native technologies for scalability and resilience in software development, *International Journal of Science and Research Archive*, 11(2), 330-337.

- Rahayu, R., & Day, J. (2017). E-commerce adoption by SMEs in developing countries: evidence from Indonesia, *Eurasian Business Review*, 7(1), 25-41.
- Raj, B., & Upadhyay, V. (2020). Role of FinTech in accelerating financial inclusion in India. In *3rd International conference on economics and Finance organised by the Nepal Rastra Bank at Kathmandu, Nepal during February* (pp. 28-29).
- World Bank. (2021). *World development report 2021: Data for better lives*, Washington, DC: World Bank.