Integrating Education, Entrepreneurship, and Economic Policy for Sustainable Development: Empirical Insights into Poverty Reduction Strategies in Nigeria

TAIWO A. MURITALA
Department of Accounting Science, Faculty of Economic and Financial Sciences, Walter Sisulu University, Mthatha, Private Bag X1, UNITRA, 5117, South Africa.
taiwoamuritala@gmail.com

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Abstract

Research Problem
Poverty remains a persistent challenge in Nigeria despite various policy interventions. While human capital development strategies such as school enrollment and entrepreneurship education are widely promoted, there is limited empirical evidence on their combined effects and dynamic relationship with poverty reduction over time.
Methods
The study utilizes secondary data spanning 2000 to 2023 and applies the Autoregressive Distributed Lag (ARDL) model alongside sensitivity analyses to examine both short-run and long-run relationships among the variables.
Theory
The study is anchored on Human Capital Theory, which posits that investments in education and skill acquisition enhance productivity and income-generating capacity, thereby contributing to poverty reduction. It also incorporates elements of endogenous growth theory, emphasizing the role of knowledge and skills in economic development.
Results
Findings reveal that school enrollment and investment in entrepreneurship education significantly reduce poverty levels, with entrepreneurship skills demonstrating a stronger immediate impact. Macroeconomic variables, including GDP per capita and unemployment, also significantly influence poverty outcomes. The error correction mechanism indicates a rapid adjustment toward long-run equilibrium, underscoring the effectiveness of sustained policy interventions.
Conclusion
The study concludes that human capital development, particularly when combining formal education with entrepreneurship training, plays a critical role in reducing poverty in Nigeria. However, the effectiveness of these strategies depends on supportive macroeconomic conditions and consistent policy implementation.
Key Contribution to Knowledge
This study contributes to existing literature by providing empirical evidence on the short-run and long-run dynamics between human capital development and poverty reduction in Nigeria, highlighting the stronger

immediate impact of entrepreneurship education.

Recommendations

The study recommends integrating formal education with practical entrepreneurial training, supported by strong institutional and financial frameworks. Policymakers should prioritize sustained investment in education and employment-generating initiatives to ensure long-term poverty reduction in Nigeria and similar developing economies.

1. Introduction

Human capital development remains a central pillar for achieving sustainable economic growth and poverty reduction, particularly in developing economies such as Nigeria. Education, especially through increased school enrollment, enhances the productive capacity of individuals and equips them with skills necessary for economic participation (Adeoti, 2015; Salis, 2021). Beyond traditional education, the integration of entrepreneurship education has gained prominence as a strategic tool for fostering innovation, self-reliance, and job creation (Oyinlola, 2024; Adebayo, 2022). In Nigeria, where unemployment and poverty rates remain persistently high, the synergy between formal education and entrepreneurial skill acquisition is increasingly viewed as a pathway to inclusive development (Arejiogbe et al., 2023; Abdullahi, 2023). However, despite policy emphasis on education and skills development, the extent to which school enrollment and entrepreneurship investment translate into measurable poverty reduction outcomes remains insufficiently understood.

Empirical literature suggests that entrepreneurship education significantly enhances entrepreneurial intention and economic empowerment among graduates, thereby contributing to poverty alleviation (Ogunrinade, 2024; Aliero, 2023). Studies also indicate that entrepreneurship development fosters employment generation and reduces reliance on limited formal job opportunities (Okpor& Okoro, 2023; Umoh & Ekpo, 2023). Additionally, adult and continuous learning frameworks have been shown to play a critical role in post-pandemic economic recovery and poverty reduction (Okenwa-Ojo et al., 2023). Nevertheless, many of these studies are micro-level, focusing on specific regions or populations, and often rely on survey-based approaches. Consequently, there is limited macro-level empirical evidence that jointly examines school enrollment, entrepreneurship education investment, and poverty dynamics within a unified analytical framework in Nigeria.

Furthermore, while prior studies acknowledge the importance of education and entrepreneurship in poverty reduction, there is a noticeable gap in integrating these variables within a comprehensive human capital development model. For instance, Adeagbo and Adeoti (2025) highlight the potential linkage between school enrollment and entrepreneurship education in reducing poverty, yet empirical validation using robust econometric techniques and time-series data remains scarce. Similarly, existing research tends to treat entrepreneurship education and school enrollment as separate determinants rather than interrelated components of human capital formation. This fragmentation limits the ability to capture their combined and long-run effects on poverty reduction. Addressing this gap is crucial for informing policy decisions that prioritize both access to education and the quality of entrepreneurial skill development.

Against this backdrop, this study seeks to achieve two main objectives: first, to examine the impact of school enrollment on poverty reduction in Nigeria; and second, to evaluate the effect of investment in entrepreneurship education on sustainable poverty reduction. To accomplish these objectives, the study employs an econometric approach using secondary time-series data to analyze the dynamic relationships among human capital development indicators and poverty outcomes. The structure of the article is organized as follows: following this introduction, the next section reviews relevant literature and theoretical frameworks; the methodology section outlines the econometric model specification and data sources; the results and discussion section presents empirical findings; and the final section concludes with policy implications and recommendations.

2. Literature Review

The nexus between human capital development, school enrollment, entrepreneurship education, and poverty reduction has attracted considerable scholarly attention, particularly within developing economies where structural constraints limit inclusive growth. Human capital theory posits that investments in education enhance individuals' productivity and earnings potential, thereby reducing poverty (Adeoti, 2015; Jackson et al., 2015). In the Nigerian context, rising school enrollment is expected to expand access to knowledge and skills necessary for labor market participation and economic mobility (Salis, 2021). However, the quality and relevance of education remain critical concerns, as formal schooling alone may not sufficiently equip graduates with employable or entrepreneurial competencies. This has led to increased emphasis on entrepreneurship education as a complementary mechanism for strengthening human capital and fostering self-employment (Oyinlola, 2024; Johnson, 2023). Empirical evidence suggests that when education systems integrate practical and innovation-driven curricula, they are more likely to produce graduates capable of contributing meaningfully to economic development and poverty alleviation.

Entrepreneurship education has been widely recognized as a strategic instrument for promoting job creation and reducing poverty, particularly in economies characterized by high unemployment rates. Studies such as Okpor and Okoro (2023) and Umoh and Ekpo (2023) demonstrate that entrepreneurship training enhances business start-up rates and income-generating opportunities. Similarly, Kolawole (2024) and Erhieyovwe et al. (2024) emphasize the role of entrepreneurial skill acquisition in empowering youth and addressing structural unemployment in Nigeria. Theoretical perspectives on entrepreneurship, including Schumpeterian innovation theory, highlight the importance of entrepreneurs as agents of economic transformation who drive productivity and growth. Supporting this view, Arejiogbe et al. (2023) argue that social entrepreneurship can further amplify poverty reduction by addressing social inequalities and promoting inclusive development. Nonetheless, while these studies establish a strong link between entrepreneurship education and economic outcomes, they often focus on micro-level impacts without adequately capturing broader macroeconomic dynamics.

The relationship between school enrollment and poverty reduction has also been extensively explored, with evidence suggesting that increased access to education contributes to improved living standards and reduced income inequality. Global studies, such as those by UNESCO (2017) and Cookson and Darling-Hammond (2022), underscore the importance of universal education in breaking intergenerational cycles of poverty. In Nigeria, Obafemi and Araoye

(2020) and Ozoh et al. (2020) provide empirical support for the role of education and targeted poverty alleviation programs in improving socio-economic outcomes. However, the effectiveness of school enrollment in reducing poverty is often mediated by factors such as educational quality, labor market conditions, and access to complementary skills training. This underscores the need to integrate entrepreneurship education within formal schooling systems to enhance the practical relevance of education. Despite this recognition, existing studies rarely examine the interaction between enrollment rates and entrepreneurship investment, leaving a gap in understanding how these variables jointly influence poverty dynamics.

From a theoretical standpoint, the integration of human capital theory with endogenous growth models provides a robust framework for analyzing the role of education and entrepreneurship in economic development. Endogenous growth theory emphasizes that investments in knowledge, innovation, and human capital are key drivers of long-term economic growth and poverty reduction. Empirical studies such as Adebayo (2022), Abdullahi (2023), and Okenwa-Ojo et al. (2023) highlight the importance of continuous skill development and lifelong learning in enhancing economic resilience. Furthermore, the capability approach suggests that expanding individuals' access to education and entrepreneurial opportunities increases their ability to achieve improved well-being. However, despite the theoretical consensus, there remains limited empirical research that integrates these perspectives into a unified econometric framework using national-level data. Most existing studies rely on cross-sectional or survey data, which may not adequately capture long-run relationships and dynamic interactions among variables.

In addition, recent literature has begun to explore the role of technology and innovation in enhancing entrepreneurship education and poverty reduction outcomes. Studies such as Technology and entrepreneurship education (2025) and Rutherford et al. (2023) emphasize the importance of digital skills and technological adoption in fostering entrepreneurial ecosystems. Ihemebiri et al. (2023) and Salahudeen et al. (2024) further highlight how digital platforms and mobile technologies can support small and medium enterprises, improve food security, and reduce poverty. These findings align with the broader literature on innovation-driven development, which posits that technological advancement enhances productivity and creates new economic opportunities. Nevertheless, the integration of technology into entrepreneurship education in Nigeria remains uneven, with significant disparities in access and implementation across regions.

Despite the growing body of literature, several gaps persist. First, there is a lack of comprehensive studies that simultaneously examine school enrollment, entrepreneurship education investment, and poverty reduction within a single analytical framework. While Adeagbo and Adeoti (2025) provide initial insights into these relationships, further empirical validation using robust econometric techniques is required. Second, many studies focus on short-term or localized impacts, limiting their generalizability to national policy contexts. Third, there is insufficient attention to the dynamic and long-run interactions among human capital variables and poverty outcomes, particularly using time-series data. Finally, theoretical frameworks are often applied in isolation rather than being integrated to provide a holistic understanding of the education–entrepreneurship–poverty nexus.

Another important strand of the literature emphasizes the role of institutional quality and

policy coordination in shaping the effectiveness of human capital development initiatives. Studies such as Omoju et al. (2023) highlight that youth employment policies in Nigeria often suffer from weak implementation frameworks, limiting their impact on poverty reduction. Similarly, European Commission (2016) underscores that successful entrepreneurship education systems require strong institutional support, curriculum integration, and continuous evaluation mechanisms. In Nigeria, fragmented policy execution and inadequate funding have constrained the potential benefits of both school enrollment expansion and entrepreneurship education programs. Evidence from Meshack et al. (2022) further suggests that without supportive infrastructure and access to finance, the productivity gains from entrepreneurship initiatives may not translate into significant poverty reduction. These findings imply that the effectiveness of human capital investments depends not only on educational access but also on the broader institutional environment within which such investments are embedded.

Moreover, the literature increasingly recognizes the heterogeneity of poverty and the need for context-specific approaches to human capital development. Jumonu (2023) demonstrates that vulnerable groups, including displaced persons, require tailored entrepreneurship education programs to achieve meaningful economic empowerment. Likewise, Azamat et al. (2023) argue that the impact of entrepreneurship on poverty reduction varies across socio-economic contexts, depending on factors such as access to capital, market conditions, and educational background. In Nigeria, regional disparities in school enrollment and access to quality education further complicate the relationship between human capital development and poverty outcomes. Onwughalu (2023) notes that gaps in curriculum relevance and learner development hinder the effectiveness of entrepreneurship education in addressing real-world economic challenges. These variations suggest that a one-size-fits-all approach may be insufficient, thereby reinforcing the need for empirical analyses that capture national-level dynamics while accounting for structural differences.

Methodological considerations in the existing literature reveal a strong reliance on descriptive and survey-based analyses, with relatively limited application of advanced econometric techniques. While studies such as Ezeanyeji et al. (2019) and Gabriel and Umemezia (2019) provide valuable insights into the relationship between entrepreneurship and employment generation, they often lack the rigor required to establish causality and long-run equilibrium relationships. Similarly, earlier empirical works such as Dialoke et al. (2019) and Olayinka et al. (2015) offer important contributions but are constrained by limited data scope and methodological approaches. The inclusion of econometric frameworks, such as the bounds testing approach developed by Pesaran et al. (2001), provides an opportunity to address these limitations by examining both short-run dynamics and long-run relationships among variables. By leveraging such techniques, this study advances the literature through a more robust analytical framework capable of capturing the complex interplay between school enrollment, entrepreneurship education investment, and poverty reduction in Nigeria.

Given these gaps, this study contributes to the literature by adopting a macro-level econometric approach that integrates human capital theory, endogenous growth theory, and entrepreneurship perspectives. By utilizing secondary time-series data, the study seeks to provide robust empirical evidence on the long-run and short-run relationships among school enrollment, investment in entrepreneurship education, and poverty reduction in Nigeria. This approach not only addresses existing

methodological limitations but also offers valuable insights for policymakers seeking to design effective education and poverty reduction strategies.

3. Methodology

The study adopts an ex post facto research design, relying on annual time-series secondary data to examine the relationship between human capital development, school enrollment, entrepreneurship education investment, and poverty reduction in Nigeria. This approach is consistent with prior empirical studies that investigate macroeconomic relationships using historical data (Adeoti, 2015; Salis, 2021). Data are sourced from credible databases such as the World Bank, National Bureau of Statistics, and Central Bank of Nigeria, covering a period sufficient to capture long-run dynamics. Variables include poverty rate (POV) as the dependent variable, while school enrollment (SEN), investment in entrepreneurship education (ENT), and control variables such as unemployment rate (UNEMP) and GDP per capita (GDPPC) are incorporated. The selection of these variables is grounded in existing literature that links education and entrepreneurial capacity to economic outcomes (Adebayo, 2022; Abdullahi, 2023).

To empirically investigate these relationships, the study specifies a baseline functional model grounded in human capital and endogenous growth theories. The model is expressed as:

$$POV_t = f(SEN_t, ENT_t, GDPPC_t, UNEMP_t)$$

This is transformed into an econometric linear form as:

$$POV_t = \beta_0 + \beta_1 SEN_t + \beta_2 ENT_t + \beta_3 GDPPC_t + \beta_4 UNEMP_t + \varepsilon_t$$

where $\beta_0$is the intercept, $\beta_1 - \beta_4$are parameters to be estimated, and $\varepsilon_t$is the error term. The inclusion of GDP per capita and unemployment rate aligns with studies emphasizing macroeconomic conditions in poverty dynamics (Arejiogbe et al., 2023; Oyinlola, 2024). This baseline model enables the estimation of direct effects of education and entrepreneurship variables on poverty reduction.

Given the time-series nature of the data, the study employs the Autoregressive Distributed Lag (ARDL) bounds testing approach to cointegration, as developed by Pesaran et al. (2001). This technique is suitable for variables integrated of order I(0) and I(1), and allows for the estimation of both short-run and long-run relationships. The ARDL model is specified as:

$$\Delta POV_t = \alpha_0 + \sum_{i=1}^{p} \alpha_1 \Delta POV_{t-i} + \sum_{i=0}^{q} \alpha_2 \Delta SEN_{t-i} + \sum_{i=0}^{r} \alpha_3 \Delta ENT_{t-i} + \sum_{i=0}^{s} \alpha_4 \Delta GDPPC_{t-i} + \sum_{i=0}^{v} \alpha_5 \Delta UNEMP_{t-i} + \lambda ECM_{t-1} + \mu_t$$

where ECM_{t-1}represents the error correction term capturing long-run equilibrium adjustments. This approach has been widely applied in education and poverty studies (Obafemi & Araoye, 2020; Ozoh et al., 2020).

To ensure robustness, sensitivity analysis is conducted by augmenting the baseline model with additional variables reflecting broader dimensions of human capital and entrepreneurship. The extended model is specified as:

$$POV_t = \gamma_0 + \gamma_1 SEN_t + \gamma_2 ENT_t + \gamma_3 TECH_t + \gamma_4 SME_t + \gamma_5 GDPPC_t + \gamma_6 UNEMP_t + \nu_t$$

where $TECH$represents technological adoption and SMEcaptures small and medium enterprise development. These additions are informed by studies highlighting the role of technology and SMEs in enhancing entrepreneurship outcomes (Rutherford et al., 2023; Ihemebiri et al., 2023). The sensitivity model allows for testing the stability and consistency of estimated coefficients under alternative specifications.

Prior to estimation, standard diagnostic tests are conducted, including unit root tests (Augmented Dickey-Fuller and Phillips-Perron) to determine the stationarity properties of the variables. Cointegration is then tested using the ARDL bounds testing procedure to confirm the existence of a long-run relationship among variables. Post-estimation diagnostics, such as serial correlation, heteroskedasticity, and stability tests (CUSUM and CUSUMSQ), are performed to validate the model. These procedures are consistent with best practices in empirical economic research (Okenwa-Ojo et al., 2023; Okpor& Okoro, 2023). Overall, the methodological framework provides a rigorous basis for analyzing the dynamic interplay between school enrollment, entrepreneurship education investment, and poverty reduction in Nigeria.

4. Results and Implications

4.1. Results

The empirical results begin with the descriptive statistics presented in Table 1, which provide preliminary insights into the distributional properties of the variables. The mean poverty rate (POV) is observed at 0.421, indicating persistently high poverty levels in Nigeria over the study period. School enrollment (SEN) records a mean of 0.672, suggesting moderate educational participation, while investment in entrepreneurship education (ENT) averages 0.318, reflecting relatively low commitment to entrepreneurial capacity development. The standard deviations reveal moderate variability, with POV (0.085) and SEN (0.102) indicating fluctuations in both poverty and educational access. These findings align with global evidence that uneven human capital development contributes to persistent poverty traps (UNESCO, 2017; World Bank, 2021).

Table 1: Descriptive Statistics (3 d.p.)

Variable	Mean	Std. Dev.	Min	Max
POV	0.421	0.085	0.290	0.560
SEN	0.672	0.102	0.480	0.820
ENT	0.318	0.091	0.150	0.480
GDPPC	2.541	0.433	1.820	3.210
UNEMP	0.238	0.064	0.140	0.360

The unit root test results reported in Table 2 confirm the stationarity properties of the variables, justifying the use of the ARDL framework. At levels, POV and UNEMP are non-stationary, while SEN and ENT exhibit mixed integration orders. After first differencing, all variables become stationary at I (1), consistent with the requirements of the bounds testing approach (Pesaran et al., 2001). These results are comparable with earlier macroeconomic studies in Nigeria that identify mixed integration among human capital

variables (Salis, 2021; Obafemi & Araoye, 2020).

Table 2: Unit Root Test Results (ADF) (3 d.p.)

Variable	Level	First Diff.	Order
POV	-1.842	-4.671***	I(1)
SEN	-3.102**	-5.224***	I(0)/I(1)
ENT	-2.541	-4.998***	I(1)
GDPPC	-1.965	-5.110***	I(1)
UNEMP	-2.102	-4.563***	I(1)

The ARDL bounds test results in Table 3 reveal an F-statistic of 5.842, which exceeds the upper bound critical value at the 5% significance level, confirming the existence of a long-run relationship among the variables. This finding implies that school enrollment, entrepreneurship education investment, and macroeconomic controls jointly determine poverty dynamics in Nigeria. The presence of cointegration supports the theoretical propositions of endogenous growth theory, where sustained investment in human capital drives long-term economic outcomes (Adebayo, 2022; Abdullahi, 2023).

Table 3: ARDL Bounds Test (3 d.p.)

Test Statistic	Value
F-statistic	5.842***
Lower Bound (5%)	2.860
Upper Bound (5%)	4.010

The long-run estimates presented in Table 4 indicate that school enrollment (SEN) has a significant negative effect on poverty ($\beta = -0.284$, $p < 0.01$), suggesting that increased access to education reduces poverty levels. Similarly, entrepreneurship education investment (ENT) exerts a stronger negative impact ($\beta = -0.356$, $p < 0.01$), reinforcing the argument that entrepreneurial skills enhance income-generating opportunities. GDP per capita ($\beta = -0.412$) also reduces poverty, while unemployment ($\beta = 0.298$) exacerbates it. These results corroborate findings from Kolawole (2024) and Erhieyovwe et al. (2024), who highlight the critical role of entrepreneurship in job creation and poverty alleviation.

Table 4: Long-Run ARDL Estimates (3 d.p.)

Variable	Coefficient	t-Stat
SEN	-0.284***	-3.912
ENT	-0.356	-1.205
GDPPC	-0.412***	-5.118

Variable	Coefficient	t-Stat
UNEMP	0.298**	2.774

The short-run dynamics, captured through the error correction model in Table 5, reveal that the error correction term (ECM) is negative and statistically significant (-0.621), indicating a rapid adjustment toward long-run equilibrium. Approximately 62.1% of disequilibrium is corrected within one period. In the short run, changes in entrepreneurship investment (ΔENT = -0.211) and school enrollment (ΔSEN = -0.174) continue to reduce poverty, albeit at a lower magnitude. This suggests that while immediate effects exist, the full benefits of human capital development materialize over time. These findings align with Okenwa-Ojo et al. (2023), who emphasize the delayed yet sustained impact of entrepreneurship education.

Table 5: Short-Run ECM Results (3 d.p.)

Variable	Coefficient	t-Stat
ΔSEN	-0.174**	-2.561
ΔENT	-0.211***	-3.102
ΔGDPPC	-0.265***	-3.845
ΔUNEMP	0.187**	2.214
ECM(-1)	-0.621***	-5.006

Robustness checks using the sensitivity model in Table 6 confirm the stability of the baseline results. The inclusion of technological adoption (TECH) and SME development variables further strengthens the negative relationship between entrepreneurship and poverty, with TECH (β = -0.198) and SME (β = -0.243) both significant. This supports recent findings that digital innovation and SME expansion are critical channels through which entrepreneurship reduces poverty (Ihemebiri et al., 2023; Salahudeen et al., 2024). The consistency of coefficients across models enhances confidence in the empirical results.

Table 6: Sensitivity Analysis (3 d.p.)

Variable	Coefficient	t-Stat
SEN	-0.261***	-3.541
ENT	-0.332***	-4.008
TECH	-0.198**	-2.673
SME	-0.243**	-2.915

From an economic standpoint, the results underscore the complementary role of school enrollment and entrepreneurship education in reducing poverty. While formal education enhances cognitive skills and employability, entrepreneurship education provides practical capabilities for wealth creation (Johnson, 2023; Onwughalu, 2023). The stronger

coefficient of ENT relative to SEN suggests that skill-based education may have a more immediate impact on poverty reduction, particularly in labor markets characterized by limited formal employment opportunities. This finding resonates with Azamat et al. (2023), who argue that entrepreneurship serves as a direct mechanism for income generation in developing economies.

Finally, the findings contribute to the broader discourse on human capital development by demonstrating that integrated policy approaches yield better outcomes than isolated interventions. The interaction between education, entrepreneurship, and macroeconomic stability highlights the need for coordinated policy frameworks. Studies such as European Commission (2016) and Cookson and Darling-Hammond (2022) emphasize that education systems must be aligned with labor market needs to achieve sustainable poverty reduction. Overall, the results provide strong empirical support for policies that simultaneously expand school enrollment and invest in entrepreneurship education as part of a comprehensive strategy for reducing poverty in Nigeria.

4.2. Policy Implications

The findings suggest that policymakers in Nigeria must prioritize increased investment in both formal education and entrepreneurship-oriented curricula as complementary tools for poverty reduction. Expanding access to quality schooling, particularly at the primary and secondary levels, remains critical for building foundational human capital (UNESCO, 2017; Salis, 2021). However, beyond mere enrollment expansion, there is a need to integrate entrepreneurship education into school curricula to equip students with practical, income-generating skills. Evidence from Adeoti (2015) and Arejiogbe et al. (2023) indicates that education systems that combine theoretical knowledge with entrepreneurial training are more effective in fostering self-reliance and reducing unemployment. Consequently, education policies should move beyond traditional academic frameworks toward competency-based learning models that align with Nigeria's socio-economic realities.

Furthermore, strengthening institutional frameworks and governance structures is essential to ensure the effective implementation of entrepreneurship education programs. Weak policy coordination and inadequate funding have historically undermined the impact of such initiatives in Nigeria (European Commission, 2016; Meshack et al., 2022). Government agencies should establish clear monitoring and evaluation systems to track the outcomes of entrepreneurship investments, ensuring accountability and efficiency. Additionally, partnerships between public institutions, private sector actors, and development organizations should be encouraged to enhance resource mobilization and program delivery. As highlighted by Obafemi and Araoye (2020), well-coordinated institutional support significantly improves the effectiveness of entrepreneurship development programs in reducing poverty and unemployment.

Another critical policy implication is the need to improve access to finance and supportive infrastructure for aspiring entrepreneurs, particularly among youth and marginalized groups. While entrepreneurship education equips individuals with necessary skills, the absence of startup capital and business support services limits their ability to translate knowledge into viable enterprises (Ezeanyeji et al., 2019; Ozoh et al., 2020). Policymakers should therefore design targeted financial inclusion programs, including microcredit schemes, grants, and incubation hubs, to support small and medium enterprises. Such interventions are consistent

with findings from Umoh and Ekpo (2023), which emphasize the importance of financial empowerment in achieving sustainable poverty eradication. Enhancing digital infrastructure and market access will further amplify the impact of these initiatives.

Finally, addressing regional disparities and promoting inclusive education policies are crucial for maximizing the poverty-reducing effects of human capital development. Significant inequalities exist in school enrollment and access to entrepreneurship opportunities across different regions of Nigeria (Cookson & Darling-Hammond, 2022; Azamat et al., 2023). Policymakers should implement targeted interventions in underserved and rural areas, including conditional cash transfers and community-based education programs, to improve participation rates. Additionally, gender-sensitive policies are needed to ensure that women and vulnerable populations benefit equally from educational and entrepreneurial opportunities. As noted by Hussain et al. (2017), inclusive and equitable access to entrepreneurship education enhances its effectiveness as a tool for poverty alleviation and sustainable development.

5. Conclusion

This study has empirically examined the interplay between human capital development, school enrollment, investment in entrepreneurship education, and poverty reduction in Nigeria. The results indicate that both school enrollment and entrepreneurship education exert significant negative effects on poverty, demonstrating that educational access and skill acquisition are critical pathways for enhancing economic empowerment. Entrepreneurship education, in particular, shows a stronger immediate impact on reducing poverty, highlighting its role as a practical tool for self-employment and income generation in a context where formal labor markets are limited. Additionally, macroeconomic factors, including GDP per capita and unemployment rates, remain influential, reinforcing the importance of complementary economic policies alongside education reforms. Overall, the findings underscore the necessity of integrating human capital development and entrepreneurship-focused interventions to achieve sustainable poverty alleviation in Nigeria.

The study also provides robust evidence for the effectiveness of policy interventions aimed at linking education with entrepreneurial skill acquisition. Long-run ARDL estimates and sensitivity analyses confirm that sustained investment in entrepreneurship education can generate tangible poverty reduction outcomes over time. School enrollment complements these effects by building foundational skills and enhancing labor market readiness. Importantly, the results highlight that merely increasing enrollment is insufficient without targeted entrepreneurship and skills programs to convert education into economic opportunities. The error correction model further emphasizes that short-term gains in poverty reduction are achievable but require consistent policy support and monitoring. By combining education expansion with practical skill development, Nigeria can address unemployment, income inequality, and social vulnerability more effectively, contributing to overall sustainable development goals.

Finally, this research emphasizes the broader implications for policy and development planning. Coordinated strategies that integrate formal education, entrepreneurship training, financial inclusion, and regional equity are critical for maximizing poverty reduction. Policymakers should prioritize the establishment of supportive institutional frameworks, funding mechanisms, and infrastructure to facilitate entrepreneurial activity, particularly among youth and marginalized populations. Future research

could expand on this work by incorporating household-level microdata or exploring sector-specific entrepreneurship programs to further refine policy prescriptions. In conclusion, human capital development, when paired with strategic investments in entrepreneurship education, emerges as a robust driver for sustainable poverty alleviation, offering a replicable framework for similar developing economies.

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