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Article

Empowerment Through Entrepreneurship: A Mixed-Methods Analysis of Social Grants and Economic Sufficiency

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Abstract: Entrepreneurship is crucial in promoting innovation, job creation, and poverty alleviation, particularly in developing economies. This study adopts a mixed-methods approach, using quantitative and qualitative analysis to examine macroeconomic factors' impact on entrepreneurial activity. The quantitative analysis utilises fully modified least squares and dynamic ordinary least squares to estimate long-run relationships, while the qualitative component applies thematic analysis to assess the role of school-based gardening initiatives in promoting students' economic participation. Our findings indicate that government expenditure on education significantly enhances entrepreneurship, whereas access to credit remains ineffective, suggesting persistent barriers in financial intermediation. Labour force participation shows a positive relationship with entrepreneurship, supporting the idea that a more engaged labour force promotes business creation. The findings also show a negative impact of regulatory quality on entrepreneurship, stressing the need for regulatory reforms to reduce entry barriers. While technology adoption has a delayed effect, long-term investments in digital infrastructure are recommended. At the micro-level, school-based entrepreneurship programs, such as vegetable gardening, cultivate entrepreneurial skills, though sustainability depends on consistent support and resources. Based on these findings, this study suggests the need to enhance education, improve access to finance, and streamline regulatory frameworks to promote entrepreneurship.

Keywords: entrepreneurship development; new business registrations; social grants and economic sufficiency; government expenditure; mixed-methods analysis



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1. Introduction

Entrepreneurship is one of the key drivers of economic growth and social development (Pan et al., 2024; Ncanywa, 2019). Promoting entrepreneurship in developing economies like South Africa is crucial for reducing unemployment and income inequality while promoting greater economic participation (Mokofe, 2024; Matlala & Ncube, 2025). However, the extent to which public policies influence entrepreneurial behaviour remains debatable. While social grants provide financial relief and improve livelihoods, they may stimulate entrepreneurial activity by reducing the risk of creating a dependency that discourages business creation (Gras & Mendoza-Abarca, 2014; Nzabamwita & Ndhlovu, 2024). Similarly, government expenditure on education, regulatory frameworks, and technology adoption are essential in enabling an environment for entrepreneurship (George & Prabhu, 2003; Pu

et al., 2021). Nevertheless, the relationship between these macroeconomic determinants and entrepreneurship remains underexplored, particularly in South Africa. At the same time, promoting entrepreneurship at the micro-level, such as entrepreneurial education and school-based agricultural initiatives, has emerged as a potential mechanism for advancing entrepreneurial skills and economic participation (Mayombe, 2017; Wallenborn, 2010; Booi et al., 2024).

School-based vegetable gardening, for example, has been increasingly promoted to enhance food security, instil entrepreneurial capabilities, and equip students with practical skills for self-sufficiency (Food and Agriculture Organization (FAO) (2009)). The National School Nutrition Programme (NSNP) was introduced to promote food security within South Africa, which was characterised by a notable initiative funded through a conditional grant delineated in the national budget (Omulo, 2023; Mensah & Karriem, 2021). Initially instituted as a component of the Reconstruction and Development Programmes (RDP) in 1994 under the auspices of the Department of Health, the programme witnessed a strategic transition to the Department of Education by 2004 (Department of Basic Education, 2025). The NSNP assumes a cardinal role in mitigating poverty and hunger among impoverished educational institutions, mainly targeting those classified within “quintile one to three schools”, which cater to the most economically marginalised communities. It endeavours to provide nutritious meals on time to learners, teaches healthy eating habits and lifestyles among the school populace, and substantially contributes towards food security and the promotion of sustainable food production practices within schools and their surrounding communities (Oostindjer et al., 2017; Chaudhary et al., 2020). However, the extent to which such initiatives contribute to economic engagement, particularly within underprivileged communities, remains an empirical question.

The relevance of this study lies in its contributions, as follows: (i) it investigates the macroeconomic determinants of entrepreneurship, including government expenditure on education, labour force participation, access to credit, and regulation and technology adoption in line with SDG 8 (decent work and economic growth) and SDG 10 (reduced inequalities); (ii) it bridges the gap between policy interventions and grassroots entrepreneurship, intending to ensure that national policies effectively translate into localised economic participation, supporting SDG 1 (no poverty); (iii) it examines the role of school-based entrepreneurial vegetable gardening in enhancing food security and skill development, contributing to SDG 2 (zero hunger) and SDG 4 (quality education); and (iv) it fills an important gap in the empirical literature. These are discussed below.

This study examines the macroeconomic determinants of entrepreneurship, including government expenditure on education, labour force participation, access to credit, and regulation and technology adoption, which are key drivers of economic activity in developing economies. Persistent challenges such as poverty, unemployment, and inadequate resources hinder inclusive growth, making the assessment of how these factors influence entrepreneurial behaviour essential (Ncanywa & Dyantyi, 2022). Additionally, evaluating the extent to which government expenditure on education and regulatory policies support or constrain entrepreneurship contributes to the discourse on SDG 8 (decent work and economic growth) by identifying ways to enhance self-employment, business creation, and economic performance. Likewise, this study bridges the gap between policy interventions and grassroots entrepreneurship, ensuring that national policies effectively translate into localised economic participation, thereby supporting SDG 1 (no poverty). While social protection, fiscal policies, and regulatory frameworks are designed to stimulate economic activity, their effectiveness is often limited by institutional inefficiencies and bureaucratic barriers (Torm & Oehme, 2024; Martins et al., 2024). Studies suggest that top-down policies frequently fail to reach marginalised communities, necessitating a shift towards inclusive,

bottom-up entrepreneurial strategies (Ahmad & Islam, 2024; Viswanathan et al., 2024; Fylling et al., 2019). Therefore, this study takes a step to examine the connection between macroeconomic policies and community-driven entrepreneurship to provide insights into how policy reforms can enhance economic self-sufficiency, support small-scale enterprise development, and reduce poverty.

This study looks at the role of school-based entrepreneurial vegetable gardening in enhancing food security and skill development, contributing to SDG 2 (Zero hunger) and SDG 4 (Quality Education). Food insecurity remains a pressing challenge in many developing economies due to poverty, climate change, and inadequate agricultural infrastructure (Abdullahi et al., 2024). Integrating entrepreneurial gardening programs into school curricula improves nutritional performance and equips students with essential agricultural, business, and financial literacy skills, developing long-term economic impacts (Athuman, 2023; Corio, 2022; Dyantyi et al., 2010). Studies indicate that hands-on agricultural education enhances students' knowledge of food systems, promotes self-sufficiency, and encourages future entrepreneurial ventures in agribusiness (Bamiro et al., 2024; Mukembo et al., 2023). Moreover, school-based gardening programs have improved academic performance, thinking, and problem-solving abilities (Holloway et al., 2023; Williams & Dixon, 2013); this initiative is a sustainable model for poverty reduction, youth empowerment, and local economic development.

Despite extensive studies on the role of entrepreneurship in economic growth, a gap remains in the empirical literature on how macroeconomic determinants influence entrepreneurship, particularly in developing economies. Existing studies have focused on microanalysis, firm-level, and individual-level factors while overlooking the macroeconomic and policy-driven determinants (Dileo & García Pereiro, 2019; Santoro et al., 2020; Seet et al., 2021; Razmus & Laguna, 2018; Kryeziu et al., 2024). The impact of government expenditure on education, regulatory frameworks, technology adoption, and access to credit on entrepreneurship is still growing at the macro-level, especially where public interventions and welfare policies play a crucial role in influencing economic behaviour. Moreover, at the micro-level, while welfare programs such as social grants are often criticised for creating dependency (Wood & Gough, 2006; Walker et al., 2024), their potential to serve as mechanisms for entrepreneurial activity and economic participation has not been adequately examined in empirical studies (Wei et al., 2025; Saoula et al., 2024); this study addresses this gap by assessing how macroeconomic policies influence entrepreneurship and whether the micro-effect of social grant strategies create an enabling or constraining environment for entrepreneurship in South Africa, and other developing countries with a similar structure can benefit from this study.

Given the nature of entrepreneurship, this study adopts a mixed-methods approach to capture structural and grassroots behaviour. At the macro-level, the quantitative component utilises macroeconomic data to examine how government expenditure on education, regulatory frameworks, technology adoption, and credit accessibility influence entrepreneurial activity. However, entrepreneurship also emerges from localised, community-driven initiatives, necessitating a micro-level perspective. To this end, the qualitative component employs thematic analysis of semi-structured interviews conducted at five secondary schools, examining how school-based gardening initiatives cultivate entrepreneurial skills and promote economic participation; this dual approach will assist in understanding how top-down policies interact with bottom-up entrepreneurial engagement. The main objective of this study is to examine macroeconomic factors and social grant impact on entrepreneurial activity. Specifically, this study seeks to achieve the following:

- Investigate how government expenditure on education, regulation, technology adoption, and credit access influence South Africa's entrepreneurship.

- Examine the impact of school-based vegetable gardening on entrepreneurial skills and economic participation among secondary school students in the O.R. Tambo Inland region, Eastern Cape.

This study is structured as follows: Section 1 provides the introduction. Section 2 presents the theoretical framework, methodological approaches, and hypothesis development. Section 3 details the materials and methods. Section 4 presents the results and discussion. Finally, Section 5 concludes this study by summarising its findings and providing policy recommendations.

2. Theoretical Foundations, Hypotheses Development, and Methodological Approaches

Entrepreneurship is a key driver of economic empowerment, with its success influenced by various institutional, financial, and human capital factors. Theoretically, the human capital theory shows the role of education and skill acquisition in enhancing entrepreneurial capabilities, supporting the notion that government expenditure on education raises entrepreneurship by improving knowledge and problem-solving abilities (Kucel et al., 2016; Becker, 1964). Likewise, access to credit, as framed by the financial constraint theory, is essential for business formation and expansion (Evans & Jovanovic, 1989; Charfeddine et al., 2024), while labour force participation enhances entrepreneurial engagement by reducing unemployment and promoting economic development (Rajsinghot et al., 2024). The institutional theory stresses the importance of a well-structured regulatory environment in lowering bureaucratic barriers and promoting business confidence (North, 1990; Nazir et al., 2024). Furthermore, the technological acceptance model suggests that technology facilitates entrepreneurship by reducing entry costs and enhancing market access (Silva, 2015). Regarding the social grant to finance school-based entrepreneurial initiatives, theoretically, the experiential learning theory supports the argument that hands-on programs, such as vegetable gardening, instil entrepreneurial skills, enhance food security, and promote early economic participation (Kolb et al., 2014; Sabet & Böhm, 2024).

Methodologically, entrepreneurship is a phenomenon influenced by macroeconomic conditions and micro-level behavioural changes (Vlados & Chatzinikolaou, 2020; Rachmawati, 2025). A mixed-methods approach, which integrates quantitative macro-level analysis with qualitative micro-level, will explain better how entrepreneurship contributes to economic participation and social development. The rationale for this methodological choice is rooted in the need to bridge the gap between aggregate macroeconomic behaviour and localised entrepreneurial experiences, ensuring that structural determinants and individual agencies are accounted for in the analysis (Terjesen et al., 2016).

At the macro-level, quantitative techniques allow for examining large-scale economic relationships. Empirical studies have demonstrated long-run and causal effects on entrepreneurship or production driven by key socioeconomic factors (Samadi, 2019; Dhahri et al., 2021; Abdulai & Hussain, 2024). Government expenditure on education enhances human capital, promoting entrepreneurship or increasing production over time (Arshed et al., 2024). Technological innovation stimulates economic growth but may worsen income inequality if not inclusively managed (Bhambri & Bajdor, 2025). Causal linkages indicate that access to credit, regulatory quality, and labour force participation rate influence entrepreneurial orientation and performance (Nistotskaya & Cingolani, 2016). The choice of econometric analysis is motivated through the preliminary analysis. Based on the outcome of the unit root test and cointegration test, this study investigates long-run effects and causal impact to enhance policy-relevant perceptions of the drivers of entrepreneurship. However, while this statistical analysis identifies macro-behaviour, it does not fully capture

entrepreneurs' lived experiences, motivations, and challenges, particularly in underprivileged and marginalised communities (Cooney & Licciardi, 2019).

At the micro-level, qualitative inquiry is essential for uncovering specific behaviours that may not be reflected in aggregated data. Through semi-structured interviews, case studies, and thematic analysis, this study investigates how grassroots entrepreneurial initiatives, such as school-based vegetable gardening programs, enhance food security, develop entrepreneurial skills, and improve economic performance; this approach provides rich, in-depth insights into the sociocultural and institutional factors that affect entrepreneurial behaviour, with a focus on the bottom-up perspective that complements the macro-level statistical findings (Kalisz et al., 2021; Rajagopal & Davila, 2021). However, a mixed-methods framework enhances the robustness and credibility of this study, making it more relevant for academic scholarship and policymaking (Hendren et al., 2023).

Building on the gap identified in the empirical literature (as mentioned in Section 1) and theoretical and methodological foundations outlined earlier, we formulate testable hypotheses to empirically assess the relationship between macroeconomic factors, entrepreneurship, and grassroots initiatives. Thus, this study posits the following hypotheses:

H₁. *Government expenditure on education significantly influences entrepreneurship (by improving skills, knowledge, and problem-solving capabilities).*

Government expenditure on education is crucial in promoting entrepreneurship by enhancing human capital. Investment in education improves skills, knowledge, and problem-solving capabilities essential for entrepreneurial ventures (Galvão et al., 2020; Jardim, 2021). Education equips individuals with the technical and managerial skills necessary to identify and exploit business opportunities, stimulating entrepreneurial activity (Otache, 2025). Moreover, an educated labour force contributes to innovation and economic growth, creating a conducive environment for entrepreneurial initiatives (Suguna et al., 2024; Asaleye & Ncanywa, 2025).

H₂. *Access to credit has a significant influence on entrepreneurship.*

Access to credit is one of the main factors in entrepreneurial development, facilitating capital accumulation and investment in business ventures (Kato & Chiloane-Tsoka, 2024). Entrepreneurs often face challenges in accessing financing due to asymmetric information and collateral requirements (Ncanywa, 2019). Therefore, improved access to credit through financial institutions or government initiatives can significantly enhance entrepreneurship by reducing financial constraints and enabling entrepreneurial innovation and expansion (Pu et al., 2021).

H₃. *There is a positive connection between labour force participation and entrepreneurship (the participation rate may reduce unemployment in the long run).*

A positive connection exists between labour force participation and entrepreneurship, as higher participation rates indicate an improved labour force capable of engaging in entrepreneurial activities (Akhtar et al., 2023; Xholo et al., 2025). Entrepreneurship provides an alternative to traditional employment, potentially reducing unemployment rates and enhancing economic performance (Cieřlik & van Stel, 2024). Sustainable entrepreneurial ventures contribute to job creation and economic stability, promoting long-term economic growth (Ragmoun, 2023).

H₄. *A well-structured regulatory environment promotes entrepreneurship (by reducing bureaucratic barriers and enhancing business confidence).*

A well-structured regulatory environment is vital for promoting entrepreneurship by reducing bureaucratic barriers and enhancing business confidence (Beazer, 2012). Clear and

transparent regulations encourage a business-friendly climate, inspiring entrepreneurial ventures to flourish (Matlala & Ncube, 2025; Asaleye et al., 2021). Effective regulatory frameworks streamline business procedures, facilitate market entry, and protect property rights, stimulating entrepreneurial activity and economic development (Mintah et al., 2025).

H₅. *Greater technology adoption positively influences entrepreneurial activity (by lowering entry costs and improving market access).*

Greater adoption of technology positively influences entrepreneurial activity by lowering entry costs, improving market access, and enabling innovative business activities (Huang & Zhou, 2025). Technological advancements enhance productivity and competitiveness, offering entrepreneurs new opportunities to scale their ventures and penetrate global markets (Meygoonpoury et al., 2024; Obadiaru et al., 2018). Embracing technological innovation promotes entrepreneurial opportunities, driving economic growth and sustainable development (Awad & Martín-Rojas, 2024).

Entrepreneurial skills are influenced by macroeconomic factors and localised interventions that cultivate hands-on experience and economic engagement. School-based entrepreneurial programs like vegetable gardening provide a practical platform for skill development, food security, and economic self-sufficiency (Reis & Ferreira, 2015). Integrating agricultural entrepreneurship into the curriculum has enhanced students' financial literacy, business acumen, and self-sufficiency (Oyekan, 2016). Moreover, such initiatives contribute to food security and local economic participation, as students learn resource management, market behaviour, and value-addition processes (Liu et al., 2023). Accordingly, this study offers the following hypothesis:

H₆. *School-based vegetable gardening financed via social grants positively influences students' entrepreneurial skills development.*

School-based initiatives, such as vegetable gardening programs financed via social grants, positively influence students' entrepreneurial skills development. These programs encourage practical knowledge in agricultural practices, resource management, and entrepreneurial decision-making (Liu et al., 2023). Therefore, by promoting hands-on learning experiences, school-based gardening cultivates entrepreneurial mindsets from an early age, preparing students for future economic participation and innovation (Bucea-Manea-Toniş et al., 2024).

H₇. *Participation in school-based gardening programs enhances food security (by promoting self-sufficiency and sustainable agricultural practices).*

Participation in school-based gardening programs enhances food security by promoting self-sufficiency and sustainable agricultural practices (Sharp et al., 2024). These programs empower communities to address nutritional needs and reduce dependence on external food sources, enhancing economic stability (Kanosvamaha, 2025). So, by integrating food production into educational curricula, schools contribute to broader societal goals of promoting health, environmental stewardship, and economic development (Oyekan, 2016).

H₈. *School-based entrepreneurial activities increase students' economic participation, promoting early exposure to business opportunities and income generation.*

School-based entrepreneurial activities increase students' economic participation by providing early exposure to business opportunities and income generation (Baxter et al., 2014). These activities promote entrepreneurial skills, such as initiative, creativity, and financial literacy, essential for future career success and economic empowerment (Burchi et al., 2021). Schools encourage entrepreneurial endeavours at a young age, leading to

a culture of innovation and entrepreneurship, driving sustainable economic growth and social development (Zemlyak et al., 2023).

3. Materials and Methods

3.1. Empirical Models for Macroanalysis of Determinants of Entrepreneurship

The human capital theory posits that education enhances cognitive and managerial skills, improving entrepreneurial capabilities (Becker, 1964; Kucel et al., 2016). The relationship between human capital accumulation and entrepreneurship can be expressed as follows:

$$HC_t = \delta EDU_t + \varepsilon_t \quad (1)$$

In Equation (1), HC_t represents human capital at time, EDU denotes government expenditure on education, and δ captures the effect of education on skill accumulation.

$$ENP_t = \phi HC_t + \varepsilon_t \quad (2)$$

Equation (2) expresses entrepreneurship (EDU) as a function of human capital. Substituting Equation (1) into Equation (2), we have the following:

$$ENP_t = \phi(\delta EDU_t) + \varepsilon_t \quad (3)$$

Equation (3) suggests that increasing government expenditure on education promotes entrepreneurship by enhancing the skills necessary for business creation. Access to financial resources is another critical determinant of entrepreneurship, as emphasised by the financial constraint theory (Evans & Jovanovic, 1989; Charfeddine et al., 2024). Entrepreneurs require capital to start and expand their businesses, and limited credit availability restricts business formation. The financial constraint model assumes that an individual will engage in entrepreneurship if their expected profit exceeds their opportunity cost:

$$\pi_t^E \geq \pi_t^W \quad (4)$$

π_t^E is the expected profit from entrepreneurship in Equation (4), and π_t^W is the expected wage from employment. Since expected entrepreneurial profit depends on capital availability, the credit constraint function can be written as follows:

$$K_t = \lambda ACC_t + \varepsilon_t \quad (5)$$

In Equation (5), K_t is the available capital for investment, ACC_t represents access to credit, and λ denotes the elasticity of capital with respect to credit availability. Since entrepreneurship depends on capital, we can specify Equation (6) as follows:

$$ENP_t = \theta K_t + \varepsilon_t \quad (6)$$

Substituting the capital constraint equation in Equation (6) into Equation (3), we have the following:

$$ENP_t = \phi(\delta EDU_t) + \theta(\lambda ACC_t) + \varepsilon_t \quad (7)$$

Equation (7) suggests that improved access to credit facilitates business creation by reducing financial constraints. The labour market entrepreneurship theory links labour force participation and entrepreneurship (Rajsinghot et al., 2024). High labour force participation (LFP) increases the pool of skilled individuals, thereby enhancing business creation:

$$ENP_t = \gamma LFP_t + \varepsilon_t \quad (8)$$

In Equation (8), γ represents the effect of labour force participation on entrepreneurship. Since entrepreneurship also influences the labour market, higher participation rates may reduce unemployment and drive economic expansion in the long run. Likewise, Technological advancement is crucial in enhancing entrepreneurship, as articulated in the innovation-driven growth model (Dyanty et al., 2010). Innovation (INO) facilitates business formation by reducing market entry barriers and improving productivity. We express the relationship as follows:

$$Y_t = A_t F(K_t, L_t) \quad (9)$$

In Equation (9), Y_t is output, A_t represents technological progress (proxied by innovation), and $F(K_t, L_t)$ is a production function dependent on capital (K) and (L). Since entrepreneurship drives technological adoption, we have $A_t = \eta INO_t + \varepsilon_t$, which, when substituted into the production function, yields the following:

$$ENP_t = \beta INO_t + \varepsilon_t \quad (10)$$

Equation (10) suggests that greater innovation enhances entrepreneurial activity by increasing productivity and market access. Finally, institutional quality is fundamental to entrepreneurship, as emphasised by the institutional theory (North, 1990; Nazir et al., 2024). A well-structured regulatory environment promotes business confidence by reducing bureaucratic barriers and ensuring stable property rights. The role of regulatory quality (RLQ) in entrepreneurial activity can be expressed as follows:

$$ENP_t = \rho RLQ_t + \varepsilon_t \quad (11)$$

In Equation (11), ρ captures the responsiveness of entrepreneurship to changes in regulatory quality. A stable and transparent regulatory framework enhances ease of doing business, promoting business creation and economic diversification.

Building on the theoretical framework and combining Equations (7), (8), (10), and (11), the functional specification of the model is given as follows:

$$ENP = f(LFP, EDU, ACC, INO, RLQ) \quad (12)$$

Equation (12) can be represented as an estimable log-linear model as follows:

$$\ln ENP_t = \beta_0 + \beta_1 \ln LFP_t + \beta_2 \ln EDU_t + \beta_3 \ln ACC_t + \beta_4 \ln INO_t + \beta_5 \ln RLQ_t + \varepsilon_t \quad (13)$$

In Equation (13), β_0 is the intercept; ε_t is the error term; $\beta_1, \beta_2, \beta_3, \beta_4$, and β_5 are elasticity coefficients that capture the percentage change in entrepreneurship due to changes in each explanatory variable; and t is the period of observation.

Given that the unit root test confirms the series are I (1), and Johansen's cointegration test establishes a long-run relationship, this study employs fully modified least squares (FMOLS) and dynamic least squares (DOLS) to estimate the long-run dynamics over the period 2006Q1–2024Q4. The vector error correction model (VECM) is used to analyse the causality. We ensure robustness using Canonical Cointegrating Regression (CCR). The general form of the FMOLS estimator for a cointegrated system is given as follows:

$$\hat{\beta}_{FMOLS} = \left(\sum_{t=1}^T X_t X_t' \right)^{-1} \left(\sum_{t=1}^T X_t Y_t^* \right) \quad (14)$$

In Equation (14), $Y_t^* = Y_t - \hat{\Omega}_{21}\hat{\Omega}_{22}^{-1}X_t$ is the transformed dependent variable to correct for endogeneity, and $\hat{\Omega}$ represents the long-run covariance matrix accounting for serial correlation. FMOLS adjusts for these issues, ensuring asymptotically efficient and unbiased estimates in the presence of cointegration. The general estimator for the DOLS regression model can be expressed as follows:

$$\hat{\beta}_{DOLS} = \left(\sum_{t=p+1}^{T-q} Z_t Z_t' \right)^{-1} \sum_{t=p+1}^{T-q} Z_t Y_t \quad (15)$$

In Equation (15), Y_t is the dependent variable, and X_t is the vector of explanatory variables. Note that $Z_t = [X_t, \Delta X_{t-p}, \dots, \Delta X_{t+q}]$ is the augmented regressor, which includes both the levels of the independent variables and the lags and leads of their first differences, where p and q denote the number of lags and leads of the first-differenced independent variables, respectively. Also, T is the number of observations.

The causality within the VECM framework is examined using the [Toda and Yamamoto \(1995\)](#)-augmented Granger causality test and the Wald test on the short-run coefficients, while the significance of the error correction term (α) indicates long-run causality ([Engle & Granger, 1987](#))—a statistically significant number of deviations from the long-run equilibrium influence short-term adjustments. Pairwise Granger causality tests are conducted to identify directional relationships among variables. The representation is given as follows:

$$\Delta Y_t = \alpha + \sum_{i=1}^{k-1} \psi_i \Delta Y_{t-i} + \lambda ECT_{t-1} + \varepsilon_t \quad (16)$$

In Equation (16), ΔY_t represents the first-differenced endogenous variables; ψ_i represents short-run coefficients; ECT_{t-1} is the error-correction term, capturing long-run causality; λ indicates the speed of adjustment towards equilibrium; and ε_t is the error term. Short-run causality is tested using the Wald test on ψ_i , while long-run causality is confirmed if it is statistically significant.

This study utilises quarterly data from 2006Q1 to 2024Q4 to examine the macroeconomic determinants of entrepreneurship. Entrepreneurship (EM) is proxied by new business registrations from the World Bank's Entrepreneurship Database. Labour force participation (LFP) is measured as the labour force participation rate (% of the population aged 15+) obtained from the International Labour Organization (ILO). Government expenditure on education (EDU) is represented as government expenditure on education (% of GDP) from the UNESCO Institute for Statistics (UIS). Access to credit (ACC) is proxied by domestic credit to the private sector (% of GDP), sourced from the International Monetary Fund (IMF). Innovation (INO) is measured by resident patent applications, retrieved from the World Intellectual Property Organization (WIPO), while regulatory quality (RLQ) is obtained from the Global Economy Database. The data were initially available at an annual frequency; they were converted to quarterly data using the quadratic match sum method to address the challenge of limited observations; this technique is widely used in empirical studies to preserve the original distributional properties of the data while allowing for higher-frequency analysis ([Asaleye et al., 2023](#); [Ben Jebli et al., 2022](#)). The study period starts in 2006, determined by data availability, particularly for entrepreneurship and regulatory quality.

In this study, entrepreneurship is conceptualised as the formal establishment of new businesses, proxied by new business registrations, reflecting the capacity of individuals to engage in self-employment and enterprise development; this aligns with Schumpeterian and opportunity-driven perspectives, where entrepreneurship provides economic opportunities and innovation. In this context, economic sufficiency refers to how individuals

or households achieve financial stability and reduced dependency on external assistance, particularly social grants. It involves income generation, employment sustainability, and asset accumulation, a key indicator of economic performance. With the aim of this study being the examination of the relationship between entrepreneurship and social grants, this study evaluates whether grant recipients transition from dependency to self-sufficiency through business creation, thus contributing to long-term economic empowerment.

3.2. Methodology of Micro-Case Study of Vegetable Gardening in Schools

The qualitative approach was used to investigate the experiences and perspectives of five secondary school educators in O.R. Tambo Inland, Eastern Cape, regarding promoting an entrepreneurial approach to school vegetable gardens for food-security enhancement. Data were collected through semi-structured interviews with educators, students, and meal servers involved in school-based entrepreneurial activities. Interviews were recorded using audio tapes to ensure accuracy and facilitate transcription. A purposive sampling strategy ensured diverse perspectives. Following [Braun and Clarke's \(2006\)](#) framework, the thematic analysis identified key insights related to entrepreneurial mindset, skill development, socioeconomic impact, engagement challenges, and improved resources and training.

To ensure the validity of our findings, we employed data triangulation, integrating multiple data sources, including interviews, direct observations, and policy documents; this approach allowed us to cross-verify information, reducing the risk of bias and enhancing the credibility of our conclusions. Additionally, respondent validation (member checking) was conducted by sharing preliminary findings with participants to confirm the accuracy and representativeness of the data. Reliability was strengthened through peer examination, where independent researchers reviewed the coding framework and thematic analysis to ensure consistency and reproducibility of results. Furthermore, we maintained an audit trail, documenting all data collection and analysis procedures to enhance transparency and methodological rigour. Ethical approval was obtained, and participants' confidentiality was maintained.

The O.R. Tambo District in South Africa was selected due to its persistent socioeconomic challenges, exceptionally high unemployment, and limited economic opportunities; it had a 37.71% unemployment rate in 2018, exceeding the provincial average of 36.1% due to a youthful population and limited economic opportunities ([ECSECC, 2018](#); [CoGTA, 2020](#)). The region's heavy reliance on government nutrition programs shows the urgent need for sustainable interventions. Likewise, South Africa faces poverty and food insecurity, with approximately 13.2 million people living in extreme poverty ([Statista, 2024](#)). About 2.1 million households (11.6%) reported experiencing hunger in 2021 ([Statistics South Africa, 2021](#)).

4. Presentation of Result and Evaluation of Hypotheses

4.1. Macro-Study Analysis Results

4.1.1. Preliminary Analysis for the Macroanalysis

The results of the preliminary analysis are detailed in the Appendix A. Table A1 presents the descriptive statistics and correlation analyses, indicating mean values of 5.5199 for entrepreneurship (ENP), 2.0696 for access to credit (ACC), 0.7377 for government expenditure on education (EDU), 1.2852 for innovation (INO), 1.7327 for labour force participation (LFP), and 1.8369 for regulatory quality (RLQ). The correlation analysis shows that entrepreneurship has correlation coefficients of -0.6258 with access to credit, 0.6582 with government expenditure on education, 0.4062 with innovation, 0.0152 with labour force participation, and -0.8418 with regulatory quality.

Table A2 presents stationarity test results at the level, using the Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) tests under three specifications: with intercept, with intercept and trend, and without intercept. At a 5% significance level, all variables are

found to be non-stationary at the level, except for innovation, which is significant under the intercept specification, and intercept and trend specification. However, Table A3 presents the first differences unit root test results, confirming that all variables are integrated of order one. Furthermore, Table A4 reports the Johansen cointegration test results, confirming the presence of long-run relationships among the variables. Consequently, this study employs fully modified ordinary least squares (FMOLS) and dynamic ordinary least squares (DOLS) to estimate long-run behaviour. The causality analysis was conducted the vector error correction model (VECM) framework.

4.1.2. Long-Run Behaviour Result

Table 1 presents the long-run estimation results using fully modified ordinary least squares (FMOLS) and dynamic ordinary least squares (DOLS), with entrepreneurship (ENP) proxied by new business registrations as the dependent variable. In both models, government expenditure on education (EDU), labour force participation (LFP), and regulatory quality (RLQ) are statistically significant. In contrast, access to credit (ACC) and innovation (INO) do not exhibit statistical significance.

Table 1. Long-run behaviour results.

Method: Fully Modified Least Squares (FMOLS)				
Dependent variable: ENP				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
ACC	−0.3467	0.3343	−1.0369	0.3034
EDU	1.3655	0.52431	2.6044	0.0113
INO	−0.0091	0.04161	−0.2191	0.8272
LFP	3.9160	1.0582	3.7003	0.0004
RLQ	−1.7027	0.5345	−3.1852	0.0022
C	1.5816	2.7320	0.5789	0.5645
R-squared	0.7927	Mean dependent var		5.5213
Adjusted R-squared	0.7777	S.D. dependent var		0.1317
S.E. of regression	0.0620	Sum squared resid		0.2660
Long-run variance	0.0099			
Dynamic least squares (DOLS)				
Dependent variable: ENP				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
ACC	−0.3790	0.3453	−1.0974	0.2765
EDU	1.6112	0.6051	2.6624	0.0098
INO	0.0017	0.0438	0.0388	0.9691
LFP	4.5610	1.3001	3.5080	0.0008
RLQ	−1.1948	0.7003	−1.7060	0.0928
C	−0.6037	3.5591	−0.1696	0.8658
R-squared	0.8345	Mean dependent var		5.5213
Adjusted R-squared	0.8087	S.D. dependent var		0.1317
S.E. of regression	0.0576	Sum squared resid		0.2124
Long-run variance	0.0094			

Source: authors' computation.

Under FMOLS, education (1.3655) and labour force participation (3.9160) positively influence entrepreneurship, suggesting that higher investment in education and greater labour force participation promote entrepreneurial activity; this aligns with the existing literature, which emphasises that government expenditure on education enhances human capital by improving skills, knowledge, and problem-solving capabilities, ultimately promoting entrepreneurship (Galvão et al., 2020; Jardim, 2021; Otache, 2025). Furthermore, an educated labour force contributes to innovation and economic growth, creating a conducive environment for business formation (Suguna et al., 2024). On the contrary, regulatory quality (−1.7027) has a negative impact, implying that stricter or inefficient regulatory frameworks may hinder business creation. While effective regulatory structures should ideally reduce bureaucratic barriers and enhance business confidence (Beazer, 2012; Matlala & Ncube, 2025), the findings suggest that excessive regulations might act as obstacles rather than facilitators. Mintah et al. (2025) support the idea that clear and transparent regulations encourage a business-friendly climate, streamlining business procedures and facilitating market entry. The model demonstrates strong explanatory power, with an R-squared of 0.7927 and an adjusted R-squared of 0.7777.

Similarly, the DOLS results align with FMOLS, with slightly higher coefficients for education (1.6112) and labour force participation (4.5610), further showing the positive role of education and labour force participation in driving entrepreneurship. Labour force participation plays a key role in promoting entrepreneurial activities, as it indicates improved labour market performance that can reduce unemployment through self-employment and business creation (Akhtar et al., 2023; Cieřlik & van Stel, 2024; Ragmoun, 2023). Regulatory quality remains negative (−1.1948), suggesting that regulatory constraints impede entrepreneurial activity. The model fit is slightly stronger, with an R-squared of 0.8345 and an adjusted R-squared of 0.8087. The robustness check using Canonical Cointegrating Regression (CCR) (Table A5) confirms the consistency of these findings, strengthening confidence in the long-run relationships identified.

The results show the role of education and labour force participation in promoting entrepreneurship, supporting the need for policies that enhance skill development and labour market efficiency. However, the negative impact of regulatory quality suggests that excessive or inefficient regulations may act as barriers to business creation, calling for reforms to improve the regulatory environment. The insignificance of access to credit and innovation indicates that these factors may not be immediate constraints on entrepreneurship; this may point to inefficiencies in financial intermediation and the presence of barriers, such as asymmetric information and collateral requirements, which restrict credit accessibility for entrepreneurs (Pu et al., 2021; Kato & Chiloane-Tsoka, 2024). Furthermore, while technology adoption is often associated with lower entry costs and improved market access for entrepreneurs (Huang & Zhou, 2025; Meygoonpoury et al., 2024), its impact may manifest in the long run rather than in the immediate business creation phase (Awad & Martín-Rojas, 2024).

4.1.3. Causality Result

Table 2 presents the results of the causality analysis, showing the directional relationships among the variables. The findings reveal several instances of unidirectional causality, indicating that changes in one variable drive changes in another without reciprocal feedback. Specifically, access to credit (ACC), innovation (INO), labour force participation (LFP), and regulatory quality (RLQ) granger cause entrepreneurship, suggesting that higher entrepreneurial activity enhances financial access, stimulates innovation, increases labour force participation, and influences regulatory conditions; this aligns with empirical findings that demonstrate socioeconomic factors' long-run and causal effects on entrepreneurship

and production (Samadi, 2019; Dhahri et al., 2021; Abdulai & Hussain, 2024). Entrepreneurship promotes business expansion and creates demand for financial services, driving improvements in credit accessibility and innovation (Nistotskaya & Cingolani, 2016).

Table 2. Causality result.

Long-Run Causality				Short Run Causality			
Hypothesis	ECT	t-Stat	Outcome	Hypothesis	Chi-Sq.	Prob	Outcome
$ACC \rightarrow ENP$	−0.0158	−0.9886	$ENP \rightarrow ACC$	$ACC \rightarrow ENP$	0.3306	0.8476	No causality
$ENP \rightarrow ACC$	−0.0184	−3.0596		$ENP \rightarrow ACC$	0.2689	0.8742	
$EDU \rightarrow ENP$	−0.0436	−2.3794	$EDU \rightarrow ENP$	$EDU \rightarrow ENP$	1.2916	0.5242	No causality
$ENP \rightarrow EDU$	0.0061	1.1411		$ENP \rightarrow EDU$	0.9892	0.6098	
$INO \rightarrow ENP$	−0.0133	−1.3888	$ENP \rightarrow INO$	$INO \rightarrow ENP$	0.3883	0.8235	No causality
$ENP \rightarrow INO$	0.2674	3.2195		$ENP \rightarrow INO$	0.4437	0.8010	
$IFP \rightarrow ENP$	−0.0007	−0.2355	$ENP \rightarrow IFP$	$IFP \rightarrow ENP$	0.9980	0.6071	No causality
$ENP \rightarrow IFP$	−0.0018	−2.9587		$ENP \rightarrow IFP$	0.2358	0.8888	
$RLQ \rightarrow ENP$	−0.0570	−1.8998	$ENP \rightarrow RLQ$	$RLQ \rightarrow ENP$	0.2223	0.8948	No causality
$ENP \rightarrow RLQ$	−0.0348	−3.6245		$ENP \rightarrow RLQ$	1.2238	0.5423	
$EDU \rightarrow ACC$	−0.0545	−2.4985	$EDU \rightarrow ACC$	$EDU \rightarrow ACC$	0.0857	0.9580	No causality
$ACC \rightarrow EDU$	−0.0252	−1.5716		$ACC \rightarrow EDU$	0.0170	0.9915	
$INO \rightarrow ACC$	−0.0384	−3.3008	$INO \rightleftharpoons ACC$	$INO \rightarrow ACC$	1.1307	0.5681	No causality
$ACC \rightarrow INO$	−1.0302	−3.9531		$ACC \rightarrow INO$	0.9799	0.6126	
$IFP \rightarrow ACC$	−0.0036	−0.5126	$ACC \rightarrow IFP$	$IFP \rightarrow ACC$	1.2128	0.5453	No causality
$ACC \rightarrow IFP$	0.0119	3.2450		$ACC \rightarrow IFP$	0.5548	0.7577	
$RLQ \rightarrow ACC$	−0.0587	−3.3991	$RLQ \rightarrow ACC$	$RLQ \rightarrow ACC$	0.8065	0.6681	No causality
$ACC \rightarrow RLQ$	0.0198	1.2741		$ACC \rightarrow RLQ$	2.4478	0.2941	
$INO \rightarrow EDU$	−0.0073	−0.6649	$EDU \rightarrow INO$	$INO \rightarrow EDU$	0.1509	0.9273	No causality
$EDU \rightarrow INO$	1.3922	4.4459		$EDU \rightarrow INO$	0.1174	0.9430	
$IFP \rightarrow EDU$	−0.0020	−0.3473	$EDU \rightarrow IFP$	$IFP \rightarrow EDU$	5.1462	0.0463	$IFP \rightarrow EDU$
$EDU \rightarrow IFP$	−0.0163	−3.7937		$EDU \rightarrow IFP$	4.1599	0.1249	
$RLQ \rightarrow EDU$	−0.0166	−1.2034	$EDU \rightarrow RLQ$	$RLQ \rightarrow EDU$	0.1080	0.9474	No causality
$EDU \rightarrow RLQ$	−0.0330	−2.0363		$EDU \rightarrow RLQ$	0.1145	0.9443	
$IFP \rightarrow INO$	−0.1111	−2.2952	$IFP \rightleftharpoons INO$	$IFP \rightarrow INO$	0.7027	0.7037	No causality
$INO \rightarrow IFP$	−0.0028	−2.4574		$INO \rightarrow IFP$	0.9839	0.6114	
$RLQ \rightarrow INO$	−0.1855	−3.2786	$RLQ \rightarrow INO$	$RLQ \rightarrow INO$	1.7968	0.4072	No causality
$INO \rightarrow RLQ$	−0.0034	−1.5423		$INO \rightarrow RLQ$	0.1536	0.9260	
$RLQ \rightarrow IFP$	−0.0840	−2.8929	$RLQ \rightarrow IFP$	$RLQ \rightarrow IFP$	0.3132	0.8550	No causality
$IFP \rightarrow RLQ$	−0.0028	−0.0581		$IFP \rightarrow RLQ$	0.5083	0.7756	

Source: authors' computation.

Additionally, government expenditure on education (EDU) is found to drive entrepreneurship (ENP), access to credit (ACC), innovation (INO), labour force participation (LFP), and regulatory quality (RLQ), indicating the role of education in promoting economic and institutional development; this result is consistent with prior studies that show how investment in education enhances human capital, thereby promoting entrepreneurship and production growth over time (Arshed et al., 2024). The relationship stresses the importance of education in equipping individuals with the necessary skills to engage in entrepreneurial

activities and navigate regulatory frameworks. Other notable unidirectional relationships include access to credit (ACC) and labour force participation (LFP); regulatory quality (RLQ) and access to credit (ACC); regulatory quality (RLQ) and innovation (INO); and regulatory quality (RLQ) and labour force participation (LFP). These findings emphasise the influence of regulatory conditions on financial access and innovation. A well-structured regulatory environment can enhance credit accessibility and innovation, creating a more business-friendly climate (Nistotskaya & Cingolani, 2016).

Furthermore, the results identify bidirectional causality between innovation (INO) and access to credit (ACC), as well as labour force participation (LFP) and innovation (INO), indicating a strengthening effect where innovation and financial accessibility mutually influence each other, while labour market and technological advancements exhibit feedback; this aligns with the existing literature suggesting that technological innovation is a critical driver of economic growth but can also worsen income inequality if not inclusively managed (Bhambri & Bajdor, 2025). The interaction between labour force participation and innovation shows how technological advancements influence employment and skill requirements, leading to potential shifts in labour market policies.

In the short run, no significant causal relationships are observed, except for a unidirectional causality from labour force participation (LFP) to government expenditure on education (EDU); this suggests that changes in labour force participation may influence public investment in education, potentially indicating policy responses to labour market conditions. Given the role of human capital in economic development, governments may adjust educational spending based on labour force demands to ensure sustainable economic growth and entrepreneurial development (Arshed et al., 2024).

4.2. Micro-Case Study Analysis Results

The results are structured around key themes that examine the role of entrepreneurship education in promoting self-sufficiency and economic empowerment. The analysis begins with the impact of an entrepreneurial mindset on reducing external dependency, followed by its integration into school nutrition programs for skill development. It then examines the socioeconomic benefits of entrepreneurship, the challenges in sustaining student engagement, and the practical application of entrepreneurship in school-based initiatives. Finally, it shows the role of entrepreneurship education in student development; school–community engagement; and key areas for improvement, including resources, teacher training, business partnerships, curriculum enhancement, and structural support.

4.2.1. Empowerment Through Entrepreneurial Mindset

Reducing South African schools' reliance on external nutritional support requires fostering an entrepreneurial mindset that leverages local resources and promotes self-sustaining income-generating activities. This shift empowers schools to transition from dependency to self-sufficiency in supporting their nutritional programs.

Participant Insights:

Economic participation—"An entrepreneurial mindset fosters critical thinking and income generation, reducing dependency on grants and promoting active economic engagement" (T1).

Instilling responsibility—"Teaching entrepreneurship shifts individuals from recipients to contributors, reinforcing financial independence" (T2).

Challenges and limitations—"Not all individuals are suited for entrepreneurship due to risk aversion, but for those who embrace it, the impact is transformative" (T3).

Promoting self-reliance—"This approach promotes long-term economic ownership, reducing psychological reliance on grants" (T4).

Need for training and support—“Entrepreneurship can drive financial independence, but success hinges on access to training and resources” (T5).

Evidence from the outcome shows that entrepreneurial education enhances financial autonomy, economic participation, and self-sufficiency by promoting financial literacy, business acumen, and innovation skills. School-based initiatives, such as vegetable gardening programs, promote early market exposure, strengthen food security, and develop entrepreneurial mindsets (Reis & Ferreira, 2015; Oyekan, 2016; Liu et al., 2023). Targeted training reduces psychological barriers, boosting confidence and reducing welfare dependency, while structured entrepreneurial activities cultivate creativity essential for long-term economic growth (Baxter et al., 2014; Burchi et al., 2021). Ultimately, education-driven entrepreneurship catalyses inclusive economic empowerment and sustainable development.

4.2.2. Entrepreneurial Skill Development Through the School Nutrition Programme

Practical engagement in the school nutrition programme fosters essential entrepreneurial skills, reducing dependency on external grants. Hands-on participation in school gardens, food production, and business initiatives equips students and staff with self-sufficiency and economic-independence competencies.

Participant Insights

Responsibility and time management—“Managing daily operations instils discipline, responsibility, and adherence to schedules” (T1).

Problem-solving and creativity—“Overcoming resource constraints fosters adaptability and innovative thinking” (T2).

Financial management and strategy—“Budgeting and resource allocation enhance financial literacy and strategic planning” (T3).

Networking and stakeholder engagement—“Building relationships with suppliers and officials strengthen business acumen” (T4).

Innovation and efficiency—“Optimising programme operations nurture problem-solving and entrepreneurial efficiency” (T5).

The findings show that the school nutrition programme promotes essential entrepreneurial competencies, including financial literacy, discipline, and strategic decision-making, while enhancing soft skills for leadership and adaptability. Aligning with prior findings on school-based entrepreneurial programs, such initiatives provide a foundation for financial autonomy, self-sufficiency, and business acumen (Reis & Ferreira, 2015; Oyekan, 2016). Integrating agricultural entrepreneurship, such as vegetable gardening, into educational curricula strengthens resource management skills and market awareness, contributing to food security and local economic participation (Liu et al., 2023; Sharp et al., 2024). Early exposure to entrepreneurial activities advances a culture of innovation, equipping students with the necessary skills to navigate economic challenges and pursue sustainable business ventures (Baxter et al., 2014; Burchi et al., 2021). Embedding entrepreneurial training into school nutrition programs can promote long-term economic empowerment and sustainable development.

4.2.3. Entrepreneurial Mindset as a Tool for Socioeconomic Development

Reducing reliance on nutrition grants through entrepreneurship fosters sustainable solutions, addressing nutritional needs and driving community development.

Participant Insights

Path to self-sufficiency—“Entrepreneurship creates jobs, reducing unemployment and poverty” (T1).

Economic upliftment—“Skills and confidence in business empower individuals to generate income and support communities” (T2).

Innovation and local solutions—“Creative problem-solving helps address poverty through self-driven opportunities” (T3).

Need for policy support—“Entrepreneurship requires policies and resources to maximise its impact” (T4).

Role of training and mentorship—“Access to training and funding determines entrepreneurial success” (T5).

It can be understood from the results that entrepreneurship promotes self-sufficiency, income generation, and economic improvement but thrives with structural support, including education, funding, and mentorship. Studies have documented that financial management, networking, and creative problem-solving are key entrepreneurial competencies that can be cultivated through interventions (Reis & Ferreira, 2015; Oyekan, 2016). School-based initiatives, such as vegetable-gardening programs financed via social grants, provide a practical platform for developing entrepreneurial skills, enhancing financial literacy, and encouraging business activities (Liu et al., 2023; Bucea-Manea-Țoniș et al., 2024). These programs promote food security and resource management, equipping students with the skills necessary for economic participation and innovation (Sharp et al., 2024; Kanosvamaha, 2025). Early exposure to entrepreneurship through hands-on learning promotes a culture of self-reliance, creativity, and economic empowerment, enhancing sustainable development and poverty reduction (Baxter et al., 2014; Zemlyak et al., 2023).

4.2.4. Skill Development Successes and Engagement Challenges

Entrepreneurial activities foster confidence, responsibility, and financial literacy among learners and meal servers. However, sustaining engagement is hindered by low interest, resource constraints, and the need for continuous support.

Participant Insights

Confidence and responsibility—“Some learners thrive in small business ventures, but not all are interested or motivated” (T1).

Practical skill development—“School gardens teach valuable skills, but educator time and resources limit sustainability” (T2).

Financial literacy—“Managing mini-businesses fosters responsibility, yet inconsistent follow-up weakens long-term success” (T3).

Resource management—“Meal servers gain budgeting skills but lack training in marketing and strategic planning” (T4).

Market participation—“Students engage enthusiastically in community markets, but interest fades without guidance” (T5).

Entrepreneurial initiatives promote self-efficacy and practical skills, yet challenges such as student motivation and resource constraints threaten long-term sustainability. Studies have shown the effectiveness of school-based entrepreneurial programs, particularly vegetable gardening, in enhancing financial literacy, business acumen, and self-sufficiency (Reis & Ferreira, 2015; Oyekan, 2016). These initiatives contribute to food security, resource management, and local economic participation, equipping students with market-oriented skills (Liu et al., 2023; Bucea-Manea-Țoniș et al., 2024). However, educator support and continuous mentorship are crucial for sustaining engagement and integrating entrepreneurial learning into community markets (Sharp et al., 2024; Kanosvamaha, 2025). With early exposure to entrepreneurship, schools cultivate an innovation-driven mindset, promoting economic empowerment and long-term sustainable development (Baxter et al., 2014; Zemlyak et al., 2023).

4.2.5. Practical Entrepreneurship in School-Based Initiatives

Educators, meal servers, and learners gain hands-on entrepreneurial experience through school gardens, mini-enterprises, after-school clubs, and community markets, fostering budgeting, sales, and financial management skills.

Participant Insights

Educators as facilitators—“Teachers can lead small projects like school gardens, teaching basic business skills” (T1).

Financial literacy for meal servers—“Meal servers learn budgeting by managing food orders and selling surplus produce” (T2).

Student-led enterprises—“Learners engage in mini-businesses like craft or food sales, gaining business experience” (T3).

Entrepreneurship clubs—“After-school clubs help students develop business ideas, market products, and manage finances” (T4).

Community market participation—“Selling goods in community markets builds financial and customer service skills” (T5).

Evidence from the findings shows that school-based entrepreneurship promotes financial literacy and business penetration by engaging learners in real-world economic activities. Empirical studies affirm that entrepreneurial initiatives, such as vegetable gardening, provide students with practical exposure to financial decision-making, resource management, and market behaviour (Reis & Ferreira, 2015; Oyekan, 2016; Liu et al., 2023). These programs enhance self-sufficiency and economic participation, encouraging early exposure to business opportunities and income generation (Baxter et al., 2014; Burchi et al., 2021). Furthermore, school-based entrepreneurial activities contribute to food security and economic empowerment by integrating sustainable agricultural practices and the development of innovation-driven mindsets (Sharp et al., 2024; Kanosvamaha, 2025). However, sustained support, mentorship, and resources remain crucial for long-term success, ensuring these initiatives translate into lasting economic and social benefits (Zemlyak et al., 2023).

4.2.6. Entrepreneurship Education for Student Development and Community Engagement

Entrepreneurship education equips students with essential life skills, enhances career prospects, and strengthens school–community ties through real-world business experiences.

Participant Insights

Building life and career skills—“Students gain problem-solving, financial management, and creativity skills, preparing them for future careers” (T1).

Enhancing learning through practical application—“Entrepreneurship makes learning engaging by providing real-world, applicable skills” (T2).

Strengthening school–community ties—“Business projects foster relationships with local businesses, benefiting both students and schools” (T4).

Boosting career prospects—“Entrepreneurial skills improve job readiness and create opportunities for internships and business partnerships” (T5).

The findings show that entrepreneurship education plays a role in equipping students with essential skills for economic participation. Empirical evidence reported that school-based entrepreneurial initiatives, such as vegetable gardening, enhance financial literacy, business acumen, and self-sufficiency by integrating real-world economic activities into the curriculum (Reis & Ferreira, 2015; Oyekan, 2016; Liu et al., 2023). Additionally, school–business partnerships are essential for industry exposure and mentorship, impacting community development (Baxter et al., 2014; Burchi et al., 2021). These programs cultivate entrepreneurial mindsets and contribute to socioeconomic goals, including food security and local economic empowerment (Sharp et al., 2024; Kanosvamaha, 2025).

4.2.7. Enhancing Entrepreneurship Education: Key Areas for Improvement

Schools must invest in resources, teacher training, business partnerships, curriculum enhancement, and student support to promote an entrepreneurial mindset and long-term economic self-sufficiency.

Participant Insights

Investing in resources—“More materials like textbooks, software, and practical tools would improve entrepreneurship lessons” (T1).

Training educators—“Teachers need training in modern business practices and teaching methods to deliver effective entrepreneurship education” (T2).

Building business partnerships—“Collaborations with local businesses can provide students with mentorship, real-world experience, and internships” (T3).

Enhancing the curriculum—“Entrepreneurship courses should include hands-on projects and case studies to bridge theory and practice” (T4).

Providing structural support—“Students need funding, space, and mentorship to turn business ideas into successful ventures” (T5).

The findings show that strengthening entrepreneurship education requires updated learning materials, continuous teacher development, and industry collaborations to enhance career readiness. Empirical studies have reported on the effectiveness of hands-on curricula, such as school-based vegetable gardening, in equipping students with business problem-solving skills, financial literacy, and self-sufficiency (Reis & Ferreira, 2015; Oyekan, 2016; Liu et al., 2023). These initiatives cultivate entrepreneurial mindsets early on and contribute to socioeconomic factors, including food security and economic participation (Sharp et al., 2024; Kanosvamaha, 2025). Moreover, access to funding and mentorship remains crucial for sustaining student-led ventures, strengthening the need for structured support systems within educational institutions (Baxter et al., 2014; Burchi et al., 2021). Therefore, schools must integrate experiential learning, industry linkages, and financial resources to maximise impact, ensuring a well-supported entrepreneurial learning environment that promotes long-term economic empowerment (Zemlyak et al., 2023).

4.3. Evaluation of Hypotheses and Implications

The hypotheses were evaluated using both quantitative and qualitative approaches. The quantitative analysis employed FMOLS and DOLS estimators, and hypothesis testing was conducted at a 5% significance level. The qualitative component used thematic analysis of semi-structured interviews with findings triangulated to provide a comprehensive understanding of the relationship between macroeconomic policies and grassroots entrepreneurship. The evaluation of the hypotheses and their implications are given as follows:

H₁. *Government expenditure on education significantly influences entrepreneurship.*

Education positively impacts entrepreneurship, with findings confirming that investment in human capital enhances skills, knowledge, problem-solving abilities, and the development of business creation and innovation (Galvão et al., 2020); this shows the importance of sustained public spending on education to drive entrepreneurial growth and economic development.

H₂. *Access to credit significantly influences entrepreneurship.*

Contrary to expectations, credit access does not significantly affect entrepreneurship, suggesting that financial barriers such as asymmetric information and collateral constraints may restrict entrepreneurial financing (Pu et al., 2021). Therefore, addressing inefficiencies in credit allocation is essential to enhance financial accessibility for business formation.

H₃. Labour force participation positively connects to entrepreneurship.

Labour force participation strongly drives entrepreneurship, supporting the view that higher labour engagement promotes business creation and reduces unemployment in the long run (Akhtar et al., 2023; Cieřlik & van Stel, 2024); this stresses the need for policies that enhance labour market efficiency and skill development to sustain entrepreneurial activity.

H₄. A well-structured regulatory environment promotes entrepreneurship.

The negative impact of regulatory quality suggests that excessive bureaucratic constraints hinder entrepreneurship rather than support it. While effective regulations should enhance business confidence, restrictive policies may instead act as barriers to entry (Beazer, 2012; Matlala & Ncube, 2025). Regulatory reforms are necessary to streamline business procedures and promote an enabling environment.

H₅. Greater technology adoption positively influences entrepreneurial activity.

Technology adoption does not immediately impact entrepreneurship, implying that its benefits, such as lower entry costs and expanded market access, may take time to materialise (Awad & Martín-Rojas, 2024). Long-term investment in digital infrastructure and capacity-building is essential to unlock its full entrepreneurial potential.

H₆. School-based vegetable gardening positively influences students' entrepreneurial skills development.

Findings indicate that school gardens promote entrepreneurial skills, particularly in financial management, resource allocation, and sales. Learners gain hands-on business experience through growing, managing, and selling produce. However, sustainability depends on consistent educator support and resources. Integrating structured entrepreneurship training into gardening programs can enhance long-term skill development and ensure student engagement.

H₇. Participation in school-based gardening programs enhances food security (by promoting self-sufficiency and sustainable agricultural practices).

While school gardens contribute to food production and provide opportunities for students to engage in agriculture, challenges such as inconsistent participation and limited resources hinder long-term sustainability. Some schools successfully use gardens for nutritional support, but the widespread food security impact is limited. Strengthening institutional support, training, and funding for school-based gardening can improve its role in enhancing self-sufficiency and food security.

H₈. School-based entrepreneurial activities increase students' economic participation, promoting early exposure to business opportunities and income generation.

Evidence supports that entrepreneurship education through school-based initiatives, such as mini-businesses and community markets, enhances students' economic participation. However, engagement levels vary, and projects risk losing momentum without sustained mentorship. Embedding structured business incubation programs and mentorship opportunities into school curricula can maximise students' long-term economic participation and career prospects.

5. Conclusions and Policy Recommendations

The expansion of entrepreneurial activity is widely recognised for its ability to spur economic transformation and inclusive development. This study adopted a mixed-methods approach, combining quantitative analysis with qualitative exploration, to examine the impact of macroeconomic determinants such as government expenditure on education, access to credit, labour force participation, regulatory environment, and technology adoption

on entrepreneurial activity. The quantitative component employed fully modified least squares and dynamic ordinary least squares to estimate long-run relationships, while the qualitative part utilised thematic analysis to examine the role of school-based gardening initiatives in enhancing students' economic participation.

Evidence from the findings confirms that government expenditure on education significantly influences entrepreneurship by enhancing human capital, improving skills, and promoting innovation. These findings emphasise the importance of sustained public investment in education as a central pillar of entrepreneurial development and economic growth. Conversely, while access to credit was expected to play a role, this study found it to have a negligible impact on entrepreneurship; this suggests that financial barriers, such as asymmetric information and stringent collateral requirements, persistently limit entrepreneurs' access to funding, thus hindering business formation. The result calls for policies that address inefficiencies in financial intermediation. Also, this study revealed that higher labour force participation positively correlates with entrepreneurship, strengthening the notion that a more engaged labour force can facilitate business creation and reduce unemployment in the long run.

In contrast, the negative impact of regulatory quality on entrepreneurship shows the challenge posed by excessive or complex regulatory frameworks. Stricter regulations can stifle business creation by increasing entry costs and causing an unfavourable business climate. Thus, streamlining regulatory processes and improving transparency and efficiency in regulatory enforcement are essential to creating a more conducive entrepreneurial environment. Although technology adoption was found to have a delayed impact on entrepreneurship, this study suggests that its role in reducing entry costs and improving market access may require long-term investment in digital infrastructure and capacity-building.

In addition to these macroeconomic factors, this study found that school-based entrepreneurial initiatives, such as vegetable gardening programs, provide valuable platforms for promoting entrepreneurial skills among students. These initiatives enhance financial literacy and contribute to developing a hands-on understanding of business operations. However, the sustainability of these programs depends on consistent educator support, sufficient resources, and structured mentorship.

Based on our findings, this study suggests the following recommendations: Policymakers should prioritise increased investment in education, particularly in areas that enhance entrepreneurial skills, such as vocational training, business management, and innovation. Government expenditure should focus on integrating entrepreneurship into the curriculum, equipping students with the skills to drive business creation and innovation. Furthermore, experiential learning initiatives like business simulations and school-based entrepreneurship programs should be expanded. Secondly, policymakers should focus on reducing barriers to credit access by facilitating more inclusive financing options, such as microfinance and venture capital, and implementing measures to minimise collateral requirements. Thirdly, policies should improve labour market conditions by providing training programs that enhance skills relevant to entrepreneurship. Government initiatives that support self-employment, such as tax incentives or access to start-up capital, can encourage business creation and provide the necessary support for individuals transitioning from unemployment to entrepreneurship. Finally, the government should provide funding and technical support to expand the scope and impact of local programs, ensuring that schools have the necessary tools, training, and infrastructure to maintain successful initiatives. Strengthening partnerships with local agricultural cooperatives could also enhance market access and sustainability.

Limitations of This Study and Suggestions for Further Studies

This study's qualitative component shows the role of school-based entrepreneurship initiatives through in-depth interviews conducted at five secondary schools. The sample

selection was intentional, allowing for a detailed, specific investigation of how localised, hands-on projects influence entrepreneurial skills and economic participation. However, this limited sample size may affect the generalizability of the findings beyond the studied schools and regions. Also, this study primarily captures perceptions and experiences rather than quantifiable entrepreneurial performance, which future research could address through longitudinal tracking of student entrepreneurial activities. While macroeconomic factors were rigorously analysed, potential unobserved variables, such as sociocultural influences or the informal sector, may also affect entrepreneurship and should be examined in future studies. Finally, expanding this study to include a comparative analysis across diverse regions, income levels, and types of enterprises would provide a better understanding of entrepreneurship drivers and policy interventions' effectiveness.

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Appendix A

Table A1. Descriptive statistics and correlation analyses.

Descriptive Statistics						
	ENP	ACC	EDU	INO	LFP	RLQ
Mean	5.5199	2.0696	0.7377	1.2852	1.7327	1.8369
Median	5.5568	2.0916	0.7399	1.281	1.734	1.8464
Maximum	5.6971	2.1591	0.8258	1.825	1.7648	1.8831
Minimum	5.2398	1.9545	0.6377	0.4904	1.7001	1.7697
Std. Dev.	0.1314	0.0578	0.0511	0.3568	0.015	0.0328
Sum	419.5154	157.2942	56.0706	97.681	131.6872	139.6094
Sum Sq. Dev.	1.2955	0.2513	0.1965	9.5481	0.01703	0.0811
Observations	76	76	76	76	76	76
Correlation Analysis						
	ENP	ACC	EDU	INO	LFP	RLQ
ENP	1					
ACC	−0.6258	1				
EDU	0.6582	−0.7895	1			
INO	0.4062	−0.4314	0.616	1		
LFP	0.0152	0.4286	−0.5679	−0.3285	1	
RLQ	−0.8418	0.6098	−0.6627	−0.4012	0.1002	1

Source: authors' computation.

Table A2. Stationarity test at level.

Augmented Dickey–Fuller Test Result							
Series	Intercept		Trend and Intercept		None		Outcome
	Value	Prob	Value	Prob	Value	Prob	
ENP	−1.0558	0.7290	−2.4514	0.3509	0.6489	0.8542	NS
ACC	−1.8531	0.3524	−2.4425	0.3552	−0.8857	0.3291	NS
EDU	−0.6645	0.8486	−3.3852	0.0613	1.6777	0.9766	NS
INO	−3.1341	0.0283	−4.1617	0.0081	−0.5505	0.4754	Mix
LFP	−2.6452	0.0887	−3.2094	0.0907	−0.8746	0.3338	NS
RLQ	−0.8417	0.8010	−2.8492	0.1851	−0.8612	0.3396	NS
Phillips–Perron Test Result							
Series	Intercept		Trend and Intercept		None		Outcome
	Value	Prob	Value	Prob	Value	Prob	
ENP	−0.8340	0.8034	−1.8978	0.6458	0.9605	0.9093	NS
ACC	−1.0065	0.7472	−1.8996	0.6448	−0.9807	0.2898	NS
EDU	−0.6819	0.8444	−2.2886	0.4346	2.2205	0.9934	NS
INO	−2.4121	0.1419	−3.1333	0.1063	−0.3205	0.5668	NS
LFP	−2.2616	0.1870	−2.3013	0.4278	−0.9336	0.3091	NS
RLQ	−0.6997	0.8400	−1.9015	0.6439	−1.1004	0.2437	NS

NS is “not stationary” source: authors’ computation.

Table A3. Stationarity test at first difference.

Augmented Dickey–Fuller Test Result							
Series	Intercept		Trend and Intercept		None		Outcome
	Value	Prob	Value	Prob	Value	Prob	
ENP	−4.3233	0.0008	−4.3195	0.0051	−4.2878	0.0000	I (1)
ACC	−4.0036	0.0024	−3.9421	0.0150	−3.9239	0.0002	I (1)
EDU	−4.2291	0.0011	−4.1953	0.0073	−3.8104	0.0002	I (1)
INO	−5.5313	0.0000	−5.4961	0.0001	−5.5626	0.0000	I (1)
LFP	−3.9036	0.0032	−3.8417	0.0197	−3.8289	0.0002	I (1)
RLQ	−4.3312	0.0008	−4.4143	0.0038	−4.2573	0.0000	I (1)
Phillips–Perron Test Result							
Series	Intercept		Trend and Intercept		None		Outcome
	Value	Prob	Value	Prob	Value	Prob	
ENP	−4.3685	0.0007	−4.3573	0.0045	−4.3253	0.0000	I (1)
ACC	−4.0515	0.0020	−3.9521	0.0146	−3.9729	0.0001	I (1)
EDU	−4.2866	0.0010	−4.2542	0.0062	−3.8314	0.0002	I (1)
INO	−5.5313	0.0000	−5.4961	0.0001	−5.5626	0.0000	I (1)
LFP	−3.9589	0.0027	−3.8977	0.0169	−3.8282	0.0002	I (1)
RLQ	−4.3682	0.0007	−4.4206	0.0037	−4.2876	0.0000	I (1)

Source: authors’ computation.

Table A4. Johansen cointegration test.

Summarise All Five Sets of Assumption					
Sample: 2006Q1 2024Q4					
Included observations: 73					
Series: ENP ACC EDU INO LFP RLQ					
Lags interval: 1 to 2					
Selected (0.05 level) number of cointegrating relations by model					
Data Trend:	None	None	Linear	Linear	Quadratic
Test type	No intercept	Intercept	Intercept	Intercept	Intercept
	No trend	No trend	No trend	Trend	Trend
Trace	0	1	1	2	6
Max-Eig	0	0	0	1	1
Critical values based on MacKinnon et al. (1999)					
Source: authors' computation.					

Table A5. Robustness check results (Canonical Cointegrating Regression).

Canonical Cointegrating Regression (CCR)				
Dependent variable: ENP				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
ACC	−0.3425	0.3208	−1.0676	0.2894
EDU	1.3604	0.5079	2.6782	0.0092
INO	−0.0083	0.0392	−0.2118	0.8328
LFP	3.9228	1.0239	3.8312	0.0003
RLQ	−1.6857	0.5381	−3.1328	0.0025
C	1.5316	2.7165	0.5638	0.5747
R-squared	0.7921	Mean dependent var		5.5213
Adjusted R-squared	0.7770	S.D. dependent var		0.1317
S.E. of regression	0.0621	Sum squared resid		0.2669
Long-run variance	0.0099			
Source: authors' computation.				

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