



# From Resource Wealth to SME Growth: Structural Barriers and Entrepreneurial Realities in Porgera District, Papua New Guinea

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## Abstract

Small and Medium Enterprises (SMEs) are widely recognised as engines of inclusive economic growth; however, their development often remains constrained in resource-rich regions characterised by evolving institutional frameworks. This study examines the demographic and contextual factors associated with SME participation in the Porgera-Paiela District of Papua New Guinea. Using a cross-sectional survey, data from 382 respondents across four Local-Level Governments were analysed using binary logistic regression and descriptive analysis of perception-based responses. The regression results indicate that age and household income are significant predictors of SME ownership. Individuals aged above 50 years are significantly less likely to operate SMEs ( $OR = 0.165, p = 0.001$ ) compared with the reference group (18–30 years), while higher household income ( $>K1500$ ) is associated with a lower likelihood of SME participation ( $OR = 0.234, p = 0.002$ ), suggesting that entrepreneurship in the district is largely necessity-driven. Gender does not show a statistically significant association with SME ownership ( $OR = 0.675, p = 0.255$ ), while education demonstrates non-linear effects. In particular, respondents with high school education display lower odds of SME ownership ( $OR = 0.282, p = 0.011$ ) compared to respondents with no formal education. This pattern suggests that individuals with higher levels of education may prioritise formal employment opportunities over small business creation. The model demonstrates acceptable explanatory power (Nagelkerke  $R^2 = 0.27$ ) and good overall fit (Hosmer–Lemeshow  $p > 0.05$ ). Survey responses further indicate that access to finance, institutional coordination, benefit-sharing arrangements, and social stability influence SME development in the district. Drawing on Human Capital, Institutional, Resource-Based, and Social Capital perspectives, the study highlights how individual characteristics interact with contextual conditions to shape entrepreneurial participation in a mining-influenced local economy. The findings suggest that policies promoting entrepreneurship-oriented training, financial inclusion initiatives, improved coordination among development stakeholders, and community-based conflict resolution may support sustainable SME development in the Porgera-Paiela District.

**Keywords:** SMEs; Entrepreneurship; Institutional Constraints; Resource-Dependent Regions; Porgera District; Papua New Guinea

## 1. INTRODUCTION

### 1.1 Background of the study

Small and Medium Enterprises (SMEs) continue to be recognised globally as vital to economic development, providing employment opportunities and innovative solutions, particularly in developing countries and economically disadvantaged regions [1, 2]. On an international scale, SMEs represent approximately 90% of businesses and over 50% of employment globally [3, 4], while also promoting inclusive growth and addressing poverty. SMEs in Papua New Guinea (PNG) remain underdeveloped, as they contribute only 6% to the national GDP, according to global standards [5, 6].

### 1.2 Problem statement

The Porgera-Paiela District, located in Enga Province, demonstrates the contradictory nature of this situation. Despite significant mineral wealth and Porgera Joint Venture (PJV) investments, the district continues to face several challenges, including tribal conflict, evolving governance structures, limited

institutional support, and socio-economic inequality. These widespread challenges hinder entrepreneurial growth and impede the transition of local economic development away from extractive dependence [7, 8].

### 1.3 Theoretical framework

The research draws from integrated theoretical perspectives that unite Human Capital Theory [9] with the Resource-Based View [10], Institutional Theory [11], Social Capital Theory [12], and Schumpeter's Innovation Theory [13].

### 1.4 Research objectives

The study addresses the following objectives:

- To determine the influence of education level on SME ownership in the Porgera District.
- To assess the relationship between household income and SME participation.
- To examine the socio-political and economic barriers affecting SME development.

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- To explore the role of institutional actors, specifically PJV and the Enga Provincial Government, in supporting SME startups.
- To evaluate the impact of tribal conflict on the sustainability of SME ventures.

### 1.5 Research methodology overview

The study adopts a cross-sectional quantitative research design, combining inferential statistical analysis with descriptive examination of respondents' perceptions regarding institutional, social, and economic factors influencing SME development. The data were analysed through the binary logistic regression method, establishing age and household income as important statistical variables for determining SME involvement. The analytical approach enables assessment of demographic predictors of SME participation and interpretation of perception-based constraints related to institutions, conflict, and financial access.

### 1.6 Key Issues Identified in the Study Area

The Porgera-Paiela District presents a challenging environment for SME development despite its mineral wealth. Recurring tribal conflict, weak institutional coordination, limited financial access, and concerns over transparency in royalty distribution constrain entrepreneurial activity. Local enterprises operate within conditions of social instability, inadequate governance support, and low household income levels, which restrict capital formation and business sustainability. Dependence on subsistence farming and limited access to formal financial systems further narrow opportunities for enterprise growth. These contextual factors highlight the need to examine how demographic, institutional, and socio-political conditions shape SME participation in the district. The study contributes rare micro-level evidence on entrepreneurship in a mining-influenced district of Papua New Guinea, where SME development is shaped by both household characteristics and broader contextual conditions.

## 2. LITERATURE REVIEW

Economic development experts consider Small and Medium Enterprises (SMEs) to be vital agents of growth and innovation, as they play a crucial role in generating new jobs and contributing to economic development [14]. Papua New Guinean small and medium enterprises (SMEs) encounter severe organisational limitations that restrict their business expansion. This paper evaluates current studies to reveal significant research gaps about SME growth in the mining-impacted Porgera District of Enga Province.

### 2.1 SMEs and economic development

World Bank reports indicate that SMEs are a global phenomenon [1], accounting for 90% of all businesses and more than 50% of all employment. Asia-Pacific countries depend on SMEs to achieve inclusive economic development through income generation, innovation, and rural employment creation [2]. The Australian economy leads with SME contributions of more than 99% of all businesses, whereas PNG ranks among the lowest globally at 6%, highlighting the need for effective policy frameworks in PNG [5, 6].

### 2.2 Structural and institutional barriers

#### 2.2.1. Financial constraints and Income

Access to finance is a primary constraint for SMEs in developing economies.

In PNG, the majority of the population lacks access to formal financial institutions, with only 18% of adults holding bank accounts [1]. According to the Resource-Based View [10] access to resources such as capital is fundamental to enterprise formation and sustainability. Kim et al. [15] also show that household income levels shape one's capacity to invest in business ventures. Therefore, we hypothesise:

H<sub>1</sub>: Household income significantly influences SME participation.

#### 2.2.2 Education and Entrepreneurial Skills

Human Capital Theory [9] posits that education enhances individual productivity and entrepreneurial ability. Studies in developing regions have found that higher levels of education are positively associated with the survival and success of SMEs [16, 17]. However, in rural PNG, formal education is often limited, and vocational or informal training tends to be more practical for entrepreneurship [2]. Despite these contextual factors, education remains a central predictor in many models of entrepreneurship. Based on this theoretical and empirical grounding, we hypothesise:

H<sub>2</sub>: Higher levels of education are significantly associated with increased SME ownership.

#### 2.2.3 Social Instability and Tribal Conflict

Social instability has significant adverse effects on business growth. In conflict-prone regions like Porgera, tribal fighting, land disputes, and crime inhibit investment, disrupt supply chains, and create a high-risk environment for entrepreneurs [7, 8]. Institutional Theory [11] emphasises that entrepreneurship requires stable rules, property rights, and enforcement mechanisms. These conditions are often lacking in weak institutional settings, which makes entrepreneurship complicated and unappealing. It thus follows that we hypothesise:

H<sub>3</sub>: Socio-political conditions, such as tribal conflict and lack of institutional support, hinder SME growth.

#### 2.2.4. Mining, Corporate actors, and local entrepreneurship

Corporate Social Responsibility (CSR) schemes employed by the extractive industry are often marketed as local development initiatives that are not effectively implemented. As some research has indicated, mining companies tend to increase regional levels of income inequality by insufficiently stimulating community participation or failing to provide transparent information on how their profits are divided [18, 19]. Some studies have highlighted concerns regarding the extent of support provided by the Porgera Joint Venture (PJV) for SME development, as well as the transparency of royalty distribution to landowners [20].

#### 2.2.5 Demographic Drivers: Age

Research continues to show that age plays a crucial role in entrepreneurial activities. People in the middle-age bracket (31 to 50) generally exhibit higher rates of business ownership due to their greater experience, willingness to take risks, and economic necessity [21, 22]. The risk appetite may decrease, and older individuals might face health issues, which lowers their chances of starting new ventures. It is during middle adulthood that the demands of running a business are most significant, as suggested by the life-cycle theory of entrepreneurship. Therefore, we propose that:

H<sub>4</sub>: The Age Group significantly influences SME ownership, with middle-aged individuals more likely to own SMEs.

### 2.3 Gendered Constraints in Entrepreneurship

Although female entrepreneurship is rising globally, women in PNG face unique structural disadvantages, including limited access to capital, lack of land ownership rights, and gender-based violence [23, 24]. Social Capital Theory [12] suggests that women's community networks and informal support systems may serve as a compensatory mechanism for formal exclusion. Nonetheless, gender gaps persist, particularly in rural and patriarchal societies. We therefore hypothesise:

H<sub>5</sub>: Gender significantly affects SME ownership in the Porgera District.

### 2.4 Research gaps

Despite growing interest in entrepreneurship, few empirical studies explore how structural, demographic, and institutional factors interact in regions like Porgera. In particular, there is a gap in integrating multiple theoretical perspectives to explain SME performance in post-conflict, resource-rich settings. This study contributes to filling this gap by empirically testing five hypotheses grounded in Human Capital Theory, Institutional Theory, Resource-Based View, Social Capital Theory, and Innovation Theory [13].

### 2.5 Contributions to the Literature

This study contributes to entrepreneurship literature in three ways. First, it challenges Human Capital Theory by demonstrating that higher formal education does not necessarily increase SME participation in resource-dependent contexts. Second, it integrates multiple theoretical perspectives—Human Capital, Institutional, Resource-Based, Social Capital, and Innovation theories—within a single empirical model in a conflict-affected mining region. Third, it provides rare micro-level evidence from Porgera District, Papua New Guinea, a setting largely absent from mainstream entrepreneurship research.

## 3. CONCEPTUAL AND THEORETICAL FRAMEWORK

### 3.1 Conceptual framework

The research employs a multi-dimensional model that connects the personal attributes of respondents, including education and income, with socio-political factors (tribal conflict, governance), and institutional patronage (PJV and provincial government) to examine SME participation.

Within this framework, demographic characteristics are examined statistically through logistic regression analysis, while contextual and institutional factors are interpreted using respondents' perception-based survey responses.

#### Key Constructs:

##### Independent Variables:

**The level of education** encompasses a fundamental understanding and mastery of abilities, including literacy skills, that promote entrepreneurial work [9, 16].

**Household Income:** The required financial resources necessary to launch and sustain SME business operations, which constitute household income [15, 1].

**Social Stability:** Impact of tribal conflict, governance, and transparency [7, 8].

**Institutional support:** This includes government support for the necessary startup funds, access to credits from formal banking systems, skill training for entrepreneurship, and incubation services provided by PJV and the government [6, 2].

### Contextual and Institutional Factors:

In addition to demographic characteristics, the framework recognises broader contextual factors that shape SME development in the Porgera district. These include access to finance, social capital networks, institutional coordination, and social stability. While these factors are not directly included as predictors in the logistic regression model, they are examined through respondents' perception-based survey responses to provide contextual insights into the institutional and socio-economic environment influencing SME participation.

### Dependent Variable:

SME Ownership, measured as a binary outcome indicating whether the respondent owns or operates an SME (1 = yes, 0 = no).

### Hypothesized Relationships

- Higher education is expected to be positively associated with SME participation.
- Moderate household income is expected to support SME participation.
- Social instability is expected to constrain SME sustainability.
- Institutional support and access to finance are expected to shape the broader environment for SME participation.

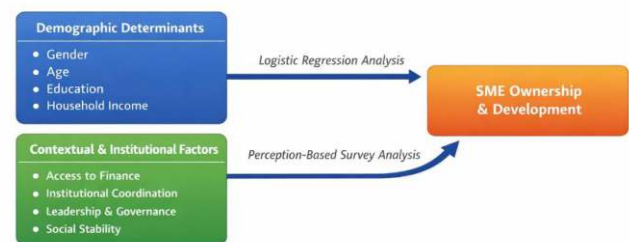


Figure 1: Conceptual Framework

**Note:** The framework illustrates the relationships between socio-demographic predictors tested in the regression model and broader contextual factors examined through perception-based survey responses.

### 3.2 Theoretical Framework

It applies five theoretical perspectives to conceptualize how education, income, social networks, institutional actors, conflicts, governance, and infrastructures impact participation in entrepreneurial activities in the Porgera district.

#### 3.2.1 Human Capital Theory on Entrepreneurship [9]

**Theory:** Highly educated people with appropriate business skills generate improved productivity and achieve better business success rates.

**Application:** People with secondary school or higher educational attainments in Porgera possess greater chances of starting SMEs, according to findings that support the essential role of education in business growth [16, 17].

#### 3.2.2 Resource-Based View (RBV) Theory [10]

**Theory:** The advantage of competitiveness and survival mechanisms enables individuals to access the resources.

**Application:** Porgera Joint Venture (PJV) provides financial capital to entrepreneurs, enabling them to utilize these funds for the purchase of essential equipment and the hiring of competent workers, thereby developing competitive business ventures in the Porgera district [15, 2].

### 3.2.3 Institutional Theory [11]

Theory: Institutional frameworks shape economic behaviour and performance, bringing rules, norms, and strong governance.

Application: The relatively low level of SME development in Porgera may be associated with limited governmental support, reflecting broader institutional challenges. The theoretical perspective is well-suited to the Porgera situation, where royalty mismanagement and a lack of state presence in addressing such problems are evident [6, 25].

### 3.2.4. Theory of Social Capital on entrepreneurship [12, 26]

Theory: The connection of people through social relationships and trust networks, as well as the robustness of community ties, ensures collaboration for entrepreneurship and access to resources.

Application: Informal networks, clan-based credit networks, and communal marketing systems help entrepreneurs to conduct business despite lacking formal institutions [27, 24].

### 3.2.5. Theory of Innovation [13]

Theory: The innovative development of entrepreneurship depends on the combination of its resources, products, and the local market, which is the means of entrepreneurship.

Application: The resource constraints in Porgera do not discourage creative entrepreneurship activities, which are not reflected in the provision of services and informal marketing. Entrepreneurship activities are run by community-based solutions and resource optimisation methods [2, 17].

The framework integrates multiple theoretical perspectives to facilitate a comprehensive analysis of SMEs in Porgera. It accounts for:

1. Micro-level capabilities (education, income)
2. Meso-level enablers (social networks, institutional actors)
3. Macro-level barriers (conflict, governance, infrastructure)

Such a theoretical amalgamation yields a model with strong explanatory power and practical applicability.

## 4. RESEARCH METHODOLOGY

### 4.1 Study area

The study was conducted in the Porgera-Paiela District of Enga Province, Papua New Guinea, a region renowned for its extensive mineral resources, notably gold mines, and complex socio-political and cultural contexts. This district comprises all four Local-Level Governments: Lagaip Rural, Maip-Mulitaka Rural, Paiela-Hewa Rural, and Porgera Rural. These administrative units served as the basis for sample stratification, enabling a geographically representative investigation of SME development in a mining-impacted and culturally diverse setting.

### 4.2 Population and sampling

#### 4.2.1 Estimating the adult population (18+ Years)

Statistics from the [28] indicate that the population of the Porgera-Paiela District was 191,041 individuals as of 2021, of which 55% was estimated to be adults aged 18 years and above.

$$\text{Adult Population} = \text{Total Population} \times 55\% \\ = 191,041 \times 0.55 = 105,072$$

Therefore, the estimated adult population of the Porgera-Paiela District was approximately 105,072 individuals.

### 4.2.2 Sample size determination

Cochran's formula determines the sample size for categorical data using a 95% confidence interval with a  $\pm 5\%$  margin of error, under a Z-score of 1.96, along with  $p = 0.5$  and  $q = (1-p) = (1-0.5) = 0.5$ .

$$n_0 = \frac{Z^2 \cdot p \cdot q}{e^2} = \frac{(1.96)^2 \cdot 0.5 \cdot 0.5}{(0.05)^2} = 384.16 \quad (4.1)$$

Since the population is finite, the sample was adjusted using the finite population correction:

$$n_{adj} = \frac{n_0}{1 + \left(\frac{n_0 - 1}{N}\right)} = \frac{384.16}{1 + \left(\frac{383.16}{105072}\right)} \approx 383 \quad (4.2)$$

The calculated sample size using Cochran's formula was 383 respondents. A total of 383 questionnaires were distributed; however, one questionnaire contained incomplete responses and was excluded from the analysis. Therefore, the final dataset consisted of 382 valid observations used in the statistical analysis. This minute discrepancy, approximately 0.25%, cannot affect the validity of the research.

### 4.3 Sampling procedure

The researchers employed a combination of the multi-stage stratified and random sampling procedures for data collection. In general, this sampling procedure is exceptionally efficient for surveying a vast, geographically diverse population [29]. Firstly, four sets of local level government (LLGs) in the Porgera district were selected using a stratified sampling method. There are different population sizes in each local level government. The population-proportionate sample size will give a division of the population at the strata level [30]. Simple random sampling was used in the next step of sampling, where the researchers selected wards in the four local-level governments (LLGs). Homogeneous wards ensure that all individuals in the population have an equal chance of being selected [31]. The final step in the sampling technique involved adopting the simple random principle, where numbers were assigned to households, and one adult within each household was chosen to participate in the research. The multi-stage sampling will be minimally biased because it also accommodates the diversity and geographical distribution of the population residing in remote communities [32].

### 4.4 Data collection tools

Primary data were collected using a structured questionnaire administered through face-to-face interviews with adult respondents in the Porgera-Paiela district. The questionnaire consisted primarily of closed-ended questions designed to capture respondents' socio-demographic characteristics, SME ownership status, and perceptions of factors influencing SME development.

In addition to the quantitative variables used in the regression analysis, the questionnaire included perception-based items measured on a five-point Likert scale, capturing respondents' views on institutional support, leadership, royalty distribution, and the impact of tribal conflict. These perception-based responses were analysed descriptively to complement the quantitative findings.

Secondary data were obtained from official government publications, institutional reports, and peer-reviewed academic sources to provide contextual and background information relevant to SME development in the study area.

A pilot survey involving ten respondents was conducted to refine the questionnaire and ensure clarity and contextual relevance.

#### 4.5 Data analysis

The authors processed and entered the raw data into the Statistical Package for Social Sciences (SPSS version 28.0.1) for analysis. The research employed descriptive statistics (frequency and percentage distribution) and inferential methods, specifically binary logistic regression, to analyse the relationships between SME participation and various nominal variables. A two-tailed statistical test at a 0.05 significance level was used to determine the results presented, which included odds ratios and their corresponding 95% confidence intervals.

#### 4.6 Ethical considerations

The study obtained ethical approval from the Academic Integrity and Ethics Committee of the Papua New Guinea University of Technology. The study also obtained permission for data collection from relevant local government authorities. The researchers clearly explained the objectives of their research to all participants and gave assurance of confidentiality. Before proceeding with research participation, the researchers obtained verbal consent from the participants.

#### 4.7 Limitations and Methodological Considerations

This study is limited to the Porgera-Paiela District due to time and resource constraints, which may affect the generalizability of findings beyond the study area. However, the localized focus allows for in-depth analysis of SME dynamics in a resource-rich and socially complex setting.

The cross-sectional design captures SME participation at a single point in time and does not account for longitudinal changes. Future research could adopt longitudinal approaches to examine trends over time.

While the study incorporates respondents' perception-based survey responses, it does not employ in-depth qualitative methods such as interviews or focus groups, which could provide richer contextual insights in future research.

#### 4.8 Instrument Validity and Reliability

The questionnaire was developed using established constructs from entrepreneurship literature and adapted to the local context. A pilot test involving 10 respondents resulted in minor revisions to improve clarity and contextual relevance. Internal consistency for the perception-based Likert-scale items was assessed using Cronbach's alpha, which yielded a value of 0.81, indicating acceptable reliability [33]. Construct validity was ensured through alignment of survey items with established theoretical frameworks, including Human Capital Theory [9] and Institutional Theory [11].

#### 4.9 Model Assumptions and Diagnostic Tests

Binary logistic regression was chosen as the primary inferential tool to model the relationship between socio-demographic predictors and SME ownership. The following assumptions were checked to validate the model:

**Independence of observations:** The multistage stratified random sampling ensured that each respondent was independently selected from the population, satisfying the independence criterion.

**Linearity of independent variables with log odds:** Because age, education, and household income were entered as categorical variables, the assumption of linearity in the logit was not applicable to these predictors.

**Multicollinearity:** Variance Inflation Factors (VIF) were calculated to detect multicollinearity among predictors. All VIF values were below 2, indicating an acceptable level of multicollinearity and stability of regression coefficients.

**Goodness of fit:** The model's overall fit was assessed using the Hosmer-Lemeshow test ( $p > 0.05$ ), indicating that the model provided an adequate fit to the observed data. The Nagelkerke  $R^2$  value of 0.27 showed a moderate level of explanatory power for the dependent variable.

These checks confirm that the logistic regression model used is statistically appropriate and interpretable for the study's objectives.

#### 4.10 Sample Representativeness

Data were collected through in-person interviews conducted by trained enumerators, resulting in a response rate of 99.7% (382 of 383 targeted respondents). One incomplete questionnaire was excluded using listwise deletion, with negligible impact on representativeness.

A multistage stratified random sampling strategy ensured proportional representation across the four Local-Level Governments in the district. The multistage stratified random sampling strategy was designed to improve representativeness across the four Local-Level Governments in the Porgera-Paiela District, thereby enhancing the generalizability of the findings to the study population.

## 5. RESULTS

### 5.1 Socio-demographic profile

The 382 respondents provided basic demographic information on gender, age, marital status, education, occupation, and income. These variables help explain key strengths and challenges affecting SME development in the Porgera-Paiela District.

**Table 1. Socio-Demographic Characteristics of the Respondents (N = 382)**

Variable	Category	n (%)
Gender	Male	216 (56.5%)
	Female	166 (43.5%)
	Total	382 (100%)
Age group (years)	18–30	135 (35.3%)
	31–40	154 (40.3%)
	41–50	60 (15.7%)
	Above 50	33 (8.6%)
	Total	382 (100%)
Marital Status	Single	123 (32.2%)
	Married	174 (45.5%)
	Divorced	39 (10.2%)
	Widow	46 (12.0%)
	Total	382 (100%)
Education	No formal education (illiterate)	129 (33.8%)
	Primary school	70 (18.3%)
	High school	90 (23.6%)
	Secondary and above	93 (24.3%)
	Total	382 (100%)
Occupation	Farming	190 (49.7%)
	Employed	63 (16.5%)
	Casual labor	36 (9.4%)
	Self-Employed	93 (24.3%)
	Total	382 (100%)
Household Income (K)	<500	162 (42.4%)
	500–1000	115 (30.1%)
	1001–1500	54 (14.1%)
	>1500	51 (13.4%)
	Total	382 (100%)
SME Ownership	Yes	61 (15.96%)
	No	321 (84.03%)
	Total	382 (100%)

**Note:** Data are based on a household survey of 382 respondents from four Local-Level Governments in the Porgera-Paiela District. Values are presented as frequencies and percentages.

**5.1.1 Gender distribution**

Men constitute 56.5% of respondents and women 43.5%. While participation is fairly balanced, social norms may limit women's economic engagement, highlighting the need for gender-inclusive SME policies.

**5.1.2 Age composition**

Most respondents are young to middle-aged (18–40), indicating strong entrepreneurial potential. Only 8.6% are above 50, suggesting lower economic participation among older adults.

**5.1.3 Marital status**

Married respondents form the largest group (45.5%), followed by singles (32.2%). Married individuals may pursue SMEs due to greater financial responsibilities, while widows and divorcees face higher economic vulnerability.

**5.1.4 Education levels**

Over one-third of respondents are illiterate, and only 24.3% have secondary education or higher. Low education levels constrain SME growth, underscoring the need for basic business and financial skills training.

**5.1.5 Occupational background**

Farming is the main occupation (49.7%), while only 24.3% are self-employed. This suggests strong agribusiness potential but limited entrepreneurial engagement.

**5.1.6 Household income**

Most of the respondents earn below K500 fortnightly, indicating economic vulnerability. Limited income restricts business investment, emphasising the need for microfinance and grants.

**5.1.7 SME ownership**

Only 15.96% of respondents own SMEs, revealing a large entrepreneurial gap linked to low income, limited education, and weak institutional support. Targeted SME policies are therefore essential, especially for youth and women.

**5.2 Logistic regression: Determinants of SME ownership**

Table 2 presents the binary logistic regression results examining the effects of gender, age, education, and household income on SME ownership. SME ownership is the dependent variable (1 = SME, 0 = No SME). The table reports regression coefficients, p-values, odds ratios, and 95% confidence intervals.

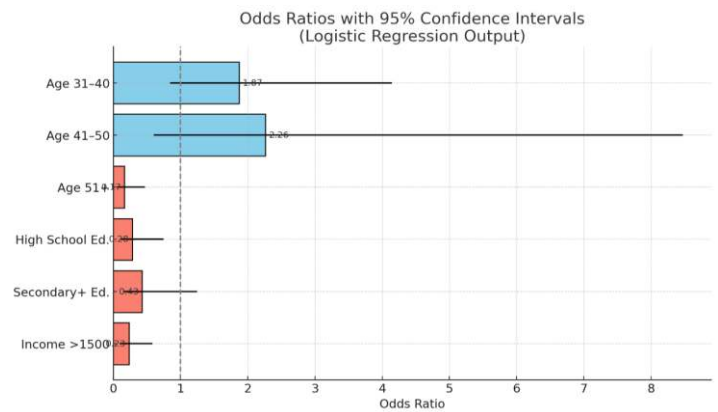


Figure 2: Logistic Regression Results for Determinants of SME Ownership

Figure 2 presents odds ratios (OR). OR>1 indicates increased likelihood; OR<1 indicates decreased likelihood. A dashed vertical line at OR = 1 helps distinguish between significant and neutral effects. Values are annotated beside each bar.

Table 2: Logistic Regression Analysis – Determinants of SME Participation

Variable	B	S.E.	Wald	p-value	Exp(B)	95% CI for Exp(B)
Gender (Ref category: Female)	-0.393	0.345	1.294	0.255	0.675	0.343 – 1.329
Age group (Ref: 18–30) Wald $\chi^2 = 24.377$ , df = 3, p < 0.001						
Age 31–40	0.626	0.406	2.379	0.123	1.871	0.844 – 4.146
Age 41–50	0.817	0.673	1.471	0.225	2.263	0.605 – 8.470
Age >50	-1.799	0.534	11.365	0.001	0.165	0.058 – 0.471
Education (Ref: No formal education) Wald $\chi^2 = 10.670$ , df = 3, p < 0.014						
Primary School	0.182	0.626	0.085	0.771	1.2	0.352 – 4.096
High School	-1.265	0.497	6.484	0.011	0.282	0.107 – 0.747
Secondary and Above	-0.849	0.545	2.429	0.119	0.428	0.147 – 1.244
Household Income (Ref: <500) Wald $\chi^2 = 10.401$ , df = 3, p < 0.015						
Income 500–1000	-0.298	0.435	0.468	0.494	0.742	0.316 – 1.743
Income 1001–1500	-0.296	0.488	0.369	0.544	0.744	0.286 – 1.934
Income >1500	-1.452	0.464	9.777	0.002	0.234	0.094 – 0.582
Constant	0.952	0.454	4.394	0.036	2.591	

Note: SME ownership is the dependent variable (1 = SME owner; 0 = non-owner). B denotes regression coefficients, Exp(B) represents odds ratios, and CI indicates 95% confidence intervals. Reference categories are shown in parentheses. Statistical significance is evaluated at p < 0.05.

**Model statistics:** N = 382. The logistic regression model shows an adequate fit to the data. The Hosmer–Lemeshow goodness-of-fit test is non-significant (p > 0.05), indicating that the model fits the observed data well. The Nagelkerke R<sup>2</sup> value of 0.27 indicates moderate explanatory power for SME participation.

**5.2.1. Gender and SME participation**

Gender, with females as the reference category, showed an insignificant effect on SME participation (B = -0.393, p = 0.255). The odds ratio, representing Exp(B) = 0.675, indicates that there are fewer male participants in SME businesses than females. The female gender demonstrates a 1.48 times higher probability of operating SMEs than males, according to the inverse

calculation of exp(B) = 1/0.675 = 1.48. Even though the result is statistically insignificant (p > 0.05), the direction suggests a slight female predominance in SME engagement. The 95% confidence interval for Exp(B) (0.343–1.329) includes 1, further confirming the non-significance of this variable.

**5.2.2. Age and SME participation**

The study analysed age using dummy variables, with the 18–30 age group serving as the reference category for the analyses. This statistical model supports the relationship between SME participation and age because the relationship is statistically highly significant (Wald  $\chi^2 = 24.377$ , df = 3, p < 0.001).

The participation rate for individuals in the 31- to 40-year age group was associated with an Exp(B) of 1.871, showing statistical insignificance (p = 0.123). Members of the 31–40 age group show 1.87 times the tendency to be involved in SMEs compared to the 18–30 demographic segment, but their data does not meet statistical significance standards. The odds ratio for the 41-50 age segment stands at 2.263, and a statistically insignificant figure of 0.225 exists (Exp(B) = 2.263, p = 0.225). The involvement rates of this older cohort are higher than those of the younger participants, yet this statistical relationship remains insignificant. According to the regression results (B = -1.799, OR = 0.165, p = 0.001), respondents above 50 years had odds of SME participation that were 83.5% lower than those of respondents aged 18–30. SME participation was significantly lower among respondents above 50 years, with a statistically significant p-value of 0.001.

Overall, SME participation follows a life-cycle pattern in which middle-aged individuals (31–50 years) show higher participation rates, while participation declines significantly among respondents above 50 years.

**5.2.3. Education and SME participation**

Education is a significant factor influencing SME participation (Wald  $\chi^2 = 10.670$ , df = 3, p = 0.014), and respondents with no formal education were used as the reference category for analyzing different educational backgrounds.

Primary School Education: B = 0.182, Exp(B) = 1.200, p = 0.771. The outcomes revealed that SME involvement tended to be greater than that of illiterate respondents, but this difference is not statistically significant.

High School Education: B = -1.265, Exp(B) = 0.282, p = 0.011. High school-educated respondents show lower participation levels in SMEs compared to respondents with no formal education, but the relationship is significant, with a p-value of 0.011. Statistical calculations show that the OR = 0.282, that implies 71.8% lower odds compared to respondents with no formal education. This pattern may indicate that respondents with higher levels of education are more likely to pursue formal employment opportunities than small business creation.

Secondary and Above: B = -0.849, Exp(B) = 0.428, p = 0.119. The data suggest that this respondent set shows reduced tendencies to participate in SMEs compared to respondents with no formal education, although the results are non-significant with a p-value of 0.119.

Observations from the education category show conflicting results (non-linear effects) because higher education does not ensure SME participation. This highlights the need for targeted skills training and entrepreneurial support beyond formal academic qualifications.

**Table 3: Respondents' Views on Factors Influencing SME Development in the Study Area**

Statement	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree	Total (%)
PJV supports business startups	3 (0.8%)	63 (16.5%)	116 (30.4%)	185 (48.4%)	15 (3.9%)	382 (100%)
Good leadership in managing accounts	3 (0.8%)	15 (3.9%)	101 (26.4%)	143 (37.4%)	120 (31.4%)	382 (100%)
The royalty payments are equally distributed	17 (4.5%)	143 (37.4%)	18 (4.7%)	114 (29.8%)	90 (23.6%)	382 (100%)
The provincial government provides support for SMEs	0 (0.0%)	28 (7.3%)	85 (22.3%)	131 (34.3%)	138 (36.1%)	382 (100%)
Tribal fighting affects businesses	182 (47.6%)	158 (41.4%)	6 (1.6%)	27 (7.1%)	9 (2.4%)	382 (100%)

**Note:** Responses were measured using a five-point Likert scale (Strongly Agree to Strongly Disagree). Results reflect respondents' perceptions of factors influencing SME development and should be interpreted as perception-based findings.

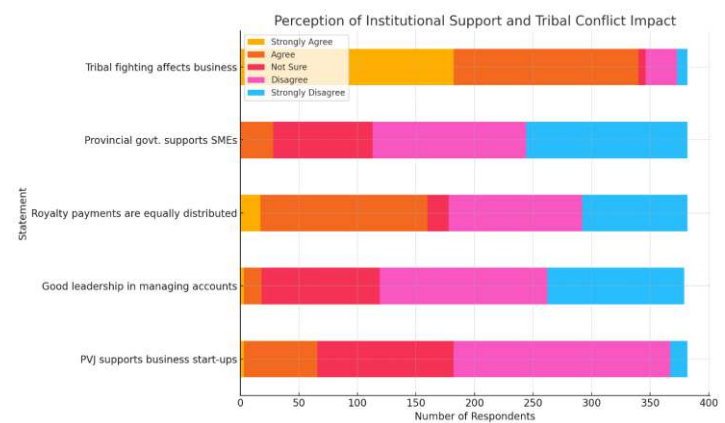
**5.2.4. Household income and SME participation**

The statistical analysis indicates that household income substantially impacts participation levels in small and medium-sized enterprises (SMEs) (Wald  $\chi^2 = 10.401$ , df = 3, p = 0.015), with an income below 500 Kina serving as the reference category. Income 500–1000 Kina: B = -0.298, Exp(B) = 0.742, p = 0.494. The higher-income group shows a reduced tendency to join SMEs compared to the lowest-income class, with less than 500 kina, although this difference remains statistically insignificant. Income 1001–1500 Kina: B = -0.296, Exp(B) = 0.744, p = 0.544. Similar to the earlier category, respondents in the 1001–1500 Kina income category also show lower odds of SME participation compared with the reference group, although this effect is not statistically significant. Income >1500 Kina: B = -1.452, Exp(B) = 0.234, p = 0.002. The results indicate that respondents earning more than 1,500 Kina had 76.6% lower odds of SME participation compared with respondents earning less than 500 Kina.

The distribution of SME involvement aligns with low-income groups, likely because these individuals often start businesses due to a lack of other employment options or because they do so out of necessity. The higher-income population tends to exhibit lower participation rates in SME businesses, as they already possess higher incomes.

**5.3 Respondents' Views on Factors Influencing SME Development in the Study Area**

The survey responses presented in Table 3 summarise respondents' views on a range of contextual and operational factors influencing SME development in the Porgera-Paiela District, highlighting how local business conditions, support mechanisms, and social dynamics shape entrepreneurial activities in the study area.



**Figure 3: Respondents' Perceptions of Factors Influencing SME Development**

**Note:** The figure summarises survey responses illustrating perceived factors influencing SME development in the study area. The results are descriptive and do not represent objective performance assessments.

### 5.3.1 Respondents' Views on PJV Support for Business Startups

The survey responses indicate mixed but generally limited perceptions regarding the role of the Porgera Joint Venture (PJV) in supporting SME startups. Nearly half of the respondents (48.4%) disagreed with the statement that PJV supports business startups, while a small proportion (16.5%) agreed. A notable share of respondents (30.4%) reported uncertainty, suggesting limited awareness or direct experience with PJV-related entrepreneurship initiatives. These responses indicated that respondents perceived PJV's engagement with local SMEs as modest or not clearly visible, highlighting the importance of improved communication, outreach, and clarity regarding available support mechanisms for local entrepreneurs.

### 5.3.2 Respondents' Views on Leadership and Financial Management

Respondents expressed predominantly cautious views regarding leadership effectiveness in financial and account management. A majority of participants (68.8%) disagreed or strongly disagreed with the statement that good leadership exists in managing accounts, while approximately one-quarter (26.4%) indicated uncertainty. Only a small proportion expressed agreement. These responses suggest that respondents associate financial management practices with varying levels of confidence, which may influence perceptions of trust, transparency, and the overall business climate for SMEs. Such perceptions underline the importance of strengthening financial literacy and management capacity to support sustainable enterprise development.

### 5.3.3 Respondents' Views on the Distribution of Royalty Payments

Responses regarding the distribution of royalty payments reflect diverse perceptions among participants. While 41.9% of respondents agreed or strongly agreed that royalty payments are equally distributed, a larger proportion (53.4%) expressed disagreement. This divergence in views suggests that perceptions of benefit distribution vary across the community. Differences in experience, access to information, and expectations may shape how respondents assess the role of resource-derived benefits in supporting local economic activities, including SME development.

### 5.3.4 Respondents' Views on Provincial Government Support for SMEs

Survey findings indicate that most respondents perceive provincial government support for SME startups as limited. A substantial majority (70.4%) disagreed or strongly disagreed with the statement that the provincial government provides support for SMEs, while 22.3% reported uncertainty. Only a small proportion (7.3%) expressed agreement. These responses suggest that respondents associate SME development with opportunities for enhanced engagement, coordination, and visibility of entrepreneurship support initiatives at the local level.

### 5.3.5 Respondents' Views on the Impact of Tribal Fighting on Business Activities

An overwhelming majority of respondents (89.0%) agreed or strongly agreed that tribal fighting affects business activities in the district.

This strong consensus indicates that respondents perceive social stability as a critical factor influencing SME operations and continuity. Disruptions associated with conflict are widely viewed as affecting market access, mobility, and investment confidence. These perceptions underscore the importance of social cohesion and stability as foundational conditions for fostering a supportive environment for entrepreneurship and local economic development.

## 6. DISCUSSION

### 6.1 Demographic Determinants of SME Participation

The regression results show that age and household income are the strongest predictors of SME participation, while gender and education display limited or inconsistent effects. These findings suggest that entrepreneurship in Porgera is shaped more by economic necessity and life-cycle factors than by formal qualifications or gender differences.

#### Gender

Hypothesis H<sub>5</sub> proposed that gender significantly affects SME ownership in the Porgera-Paiela District. However, the regression results do not support this hypothesis, as gender does not exhibit a statistically significant association with SME participation ( $p = 0.255$ ). Although female respondents show marginally higher odds of SME ownership, the effect is weak and statistically insignificant.

This finding suggests that entrepreneurship in Porgera is primarily necessity-driven rather than gender-segmented. In a context characterised by limited formal employment opportunities and widespread household economic vulnerability, both men and women appear to engage in SME activities as livelihood strategies. Structural constraints may therefore override gender-based differences predicted by conventional entrepreneurship theory.

#### Age

Age follows a life-cycle pattern. The pattern of odds ratios suggests relatively higher SME participation among respondents aged 31–50 compared with those aged 18–30, although these category-specific effects are not individually statistically significant, while participation declines significantly among respondents above 50 years ( $B = -1.799, p = 0.001$ ). This supports evidence that entrepreneurial engagement is highest during economically active years and decreases with age due to risk aversion, health constraints, or financial stability [22].

#### Education

Hypothesis H<sub>2</sub> posited that higher levels of education would be positively associated with SME ownership. The findings provide only partial and contextually contradictory support for this hypothesis. While education is jointly significant overall (Wald  $\chi^2 = 10.670, p = 0.014$ ), higher educational attainment does not consistently increase the likelihood of SME participation. In particular, respondents with high school education exhibit significantly lower odds of SME ownership compared to respondents with no formal education.

This counterintuitive pattern suggests that, in the Porgera context, formal education may function more as a signal for wage employment aspirations rather than as a driver of enterprise creation.

In segmented labour markets typical of resource-dependent regions, educated individuals may prefer scarce formal employment opportunities, while less-educated individuals are more likely to pursue SMEs as necessity-based livelihood strategies. These findings challenge standard Human Capital Theory assumptions and highlight the importance of context-specific interpretations of education entrepreneurship relationships.

### Household Income

Higher income significantly reduces the likelihood of SME participation ( $B = -1.452, p = 0.002$ ). This supports the concept of necessity entrepreneurship [34], where individuals in lower-income groups engage in business due to limited employment alternatives. In Porgera, SMEs function primarily as survival strategies rather than opportunity-driven ventures.

### Implications

Overall, the findings indicate that SME participation in Porgera is necessity-based, concentrated among middle-aged and lower-income groups. Policies should therefore prioritise targeted financial support, skills training, and microenterprise development for vulnerable populations. Overall,  $H_1$  and  $H_4$  are supported,  $H_2$  is partially supported with non-linear effects, while  $H_5$  is not supported in the Porgera context.

### 6.2 Contextual and Institutional Factors Influencing SME Development

Beyond demographic characteristics, respondents' views highlight the relevance of contextual and institutional conditions in shaping SME development in the Porgera-Paiela District. Survey responses suggest that the visibility, accessibility, and coordination of entrepreneurship-related support mechanisms influence how local entrepreneurs engage with business activities. Similar observations in the literature indicate that when support systems are not clearly communicated or widely understood, entrepreneurial participation may remain limited, particularly in resource-dependent regions [35, 2].

Respondents' perceptions regarding leadership and financial management practices indicate varying levels of confidence in the systems associated with enterprise support. Such perceptions are important, as trust and predictability are widely recognised as contributing factors to a conducive entrepreneurial environment. Institutional theory emphasises that clear procedures, accountability mechanisms, and consistent administrative practices can help reduce uncertainty and support business participation [11]. The findings therefore suggest opportunities for strengthening financial management capacity and information-sharing processes to enhance confidence among local entrepreneurs [36].

Views related to the distribution of resource-derived benefits reflect diverse experiences among respondents. While some participants perceive benefit-sharing arrangements as equitable, others express uncertainty or differing views. Prior research suggests that variations in access to information and community engagement often shape how benefit distribution is perceived in mining-affected regions [19]. Enhanced communication and inclusive dialogue may help align expectations and support broader participation in local economic activities.

Survey responses further indicate that respondents associate provincial-level engagement with potential opportunities to strengthen SME development initiatives. Studies in similar contexts highlight that locally responsive programs, combined with access to financial and technical support, can positively influence small enterprise participation [1,6]. Improved coordination and clarity around available support may therefore encourage greater engagement in SME activities.

Finally, the strong consensus among respondents regarding the influence of social stability on business operations underscores the importance of a secure and predictable environment for entrepreneurship. Existing studies consistently show that perceptions of stability are closely linked to business continuity, investment confidence, and market participation [37,7]. Overall, these findings emphasise the value of collaborative and context-sensitive approaches that support local capacity development, social cohesion, and sustainable SME growth.

### 6.3 Policy Implications

Policy interventions must address both economic vulnerability and institutional weakness.

Priority areas include:

- Targeted microcredit and financial inclusion programs for low-income households
- Vocational and entrepreneurship-oriented education reform
- Transparent royalty management and improved fiscal accountability
- Strengthened collaboration between PJV and provincial authorities
- Peacebuilding and local conflict-resolution mechanisms

Without improvements in institutional coordination and security conditions, demographic advantages alone may not fully translate into sustainable SME growth.

### 6.4 Theoretical Contributions

This study refines entrepreneurship theory in resource-rich contexts.

First, it challenges Human Capital Theory [9] by demonstrating that formal education does not necessarily increase entrepreneurial participation. In Porgera, education may redirect individuals toward formal employment aspirations rather than enterprise creation.

Second, the findings reinforce Institutional Theory [11], showing that governance challenges, poor accountability, and limited institutional legitimacy constrain entrepreneurial activity. Importantly, perceived institutional responsiveness emerges as a critical contextual factor.

By integrating demographic, institutional, and conflict variables, the study advances a context-sensitive model of entrepreneurship applicable to mining-dependent and conflict-affected economies.

### 7. CONCLUSION

This study examined the determinants influencing the participation and growth of Small and Medium Enterprises (SMEs) in the Porgera-Paiela District of Enga Province, Papua New Guinea, with a focus on socio-demographic characteristics and contextual conditions within a resource-rich local economy. The findings indicate that household income and age are significant factors shaping SME participation.

The results suggest a life-cycle pattern in which SME participation is relatively stronger among economically active age groups and significantly lower among respondents above 50 years, while lower-income households appear more likely to engage in entrepreneurial activities, highlighting the importance of SMEs as livelihood strategies in the study area.

The influence of education and gender on SME ownership was found to be limited or non-linear. While these factors remain relevant, their lack of consistent statistical significance suggests that entrepreneurial participation in rural and semi-remote settings is shaped by a combination of practical experience, household responsibilities, and local economic realities rather than formal qualifications alone. These findings underscore the complex nature of entrepreneurship in contexts where necessity-driven enterprise formation plays a prominent role.

Respondents' views further emphasise the importance of the broader operating environment in influencing SME development. Perceptions related to access to financial services, coordination among development stakeholders, benefit-sharing arrangements, and social stability shape entrepreneurial confidence and business continuity. Rather than indicating institutional shortcomings, these perceptions point to opportunities for strengthening engagement, communication, and alignment between existing support mechanisms and community expectations.

By integrating Human Capital Theory, the Resource-Based View, Institutional Theory, and Social Capital Theory, this study provides a comprehensive framework for understanding SME development in resource-dependent regions. The findings contribute to entrepreneurship literature by illustrating how individual attributes interact with contextual and institutional conditions to influence enterprise participation in emerging local economies.

From a policy and practice perspective, the results highlight the value of inclusive and locally responsive strategies. Initiatives that promote financial literacy, expand access to microfinance, support entrepreneurship-oriented skills development, and encourage collaboration among public, private, and community actors can contribute meaningfully to sustainable SME growth. With coordinated stakeholder engagement and context-sensitive approaches, the Porgera-Paiela District holds considerable potential for SME development, supporting local economic diversification, resilience, and inclusive growth in Papua New Guinea.

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## 9. CONFLICT OF INTEREST STATEMENT

The authors declare that there is no conflict of interest regarding the publication of this paper. This research was conducted independently, without any influence from entities that could affect the research design, execution, or interpretation of the results. The researchers followed open data collection practices and obtained proper ethical approvals.

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